EACTS Daily News
European Association For Cardio-Thoracic Surgery
The official newspaper of the 26th EACTS Annual Meeting 2012
Monday 29 October

In this issue

Monday's highlights

Welcome to Monday's programme, which begin with 'Professional Challenges'

In the Professional Challenge sessions, specific problem cases, in particular complication cases, will be presented. The design of these sessions facilitates interaction and discussion on controversial topics.

Topics under discussion include how to optimise coronary revascularization: planning and execution; whether there is a place for palliation in the management of fallots tetralogy; Aortic arch disease II: Video session on all proven approaches for effectively treating the arch; and

Today will also host the first 'Focussed Sessions' and will include a video demonstration, followed by a keynote lecture and conclude with presentations that allow delegates to leave the sessions with a greater understanding of how to solve a particular problem.

This will include an examination of Antiplatelet therapy in 2012 - Impact on Cardiovascular surgical procedures; How to optimise transcatheter aortic valve implantation outcomes; The Front door approach: the role of the surgeon in selecting the best patient specific access route; multiple valves; and heart rejuvenation.

As ever, Monday will also witness this year's Presidential Address by Professor Ludwig K von Segesser, entitled, "The contraindications of today are the indications of tomorrow."

Today will also see the first Late Breaking Clinical Trials session, as well as and the presentation of abstracts from all four EACTS Domains.

The Vascular Domain will host a TEVAR Simulation Workshop and Simulation Course, and the General Interest Session will look at current 'Research in Cardiothoracic Surgery'.

Ludwig von Segesser

Satellite Symposia – Monday 12:45-14:00

Abbott Vascular Scrub-in with Mitra-Clip
Berlin Heart EXCOR® Pediatric
Coroneo Aortic Valve Repair: a standardized approach
Edwards Lifesciences 50 years of AVR and 10 years of TAVI
JOTEC The future of Aortic Surgery
Maquet Cardiovascular Advances in Less Invasive CABG
Medistim Clinical and economic outcomes - quality assessment procedures
Medtronic 3f Enable valve – what have we learned?
Sorin Group The Future of Cardiac Surgery is MICS
St Jude Medical Aortic Stenosis: Treatment Options and Perspectives
Symetis ACURATE TA: Self-Positioning TAVI Technology
Vascutek Innovative Product Designs and Emerging Implantation Techniques

Congenital: Professional Challenges
08:15–09:45 **Room 111**

Surgery following primary RVOT stenting in Fallot's Tetralogy

Rehabilitation of small pulmonary arteries

David Barron *Birmingham Children's Hospital UK*

David Barron

Fallot's Tetralogy is the commonest cyanotic heart condition and the spectrum of morpholo gy leads to a variability in the symptoms (principally the degree of cyanosis) which, in turn, influences the timing and technique of surgery. The Blalock -Taussig (BT) shunt has traditionally been the mainstay of securing additional pulmonary blood flow in cyanosed neonates and infants – followed by staged anatomical repair typically 6-9 months later. However, the overwhelming shift in surgical practice to effect anatomical repair at a younger age has dramatically changed management strategies over the past 15 years such that complete repair has been promoted at an increasingly younger age. However, even in the modern era, the BT shunt in the neonate carries a significant mortality – partly reflecting the fragile nature of the shunt-dependent circulation with diastolic steal phenomenon and the risk of unpredictable coronary ischaemia. This supported the case for complete anatomical repair in the cyanotic neonate. However, the results of complete repair in neonates carry a similar risk to BT shunt, with five or six times the operative mortality compared to that of 'planned' repair performed between three to nine months of age.

A fundamental problem in the cyanotic neonatal Fallot is that there can be a degree of

Continued on page 2

Cardiac: Abstract
08:15–09:45 **Room 118/119**

The TA PLUG

Christoph Huber

The TA PLUG is the first true-percutaneous self-expanding and self-centring device to successfully close a 39F left ventricular apex access in the experimental setting.

Christoph Huber developed and pioneered the concept and the method of transapical (TA) TAVI in 2004. Only two years later Thomas Walter performed the first successful clinical implant. Since then the most promising TA TAVI technique started its steep ascension towards becoming the most popular surgical TAVI access. Significant advantages over all other access techniques including: A) Shorter working distance allowing for a more precise target site device delivery. B) Eased wire crossing of the highly stenosed aortic valve directed by the native blood flow of the ejecting heart. C) Avoided crossing of the aortic arch by the larger valve delivery systems. D) Increased access diameter resulting in less traumatic device crimping, beneficially differentiate transapical access from other TAVI access routes.

Nevertheless, despite the very favourable evidence, the enthusiasm for the transapical access is hampered by the mere fact of requiring a surgical cut-down and surgical closure.

The author's focus is to move the transapical access platform further. The last hurdle to overcome, to allow the transapical access to become the number one TAVI route, is a reliable and save true-percutaneous closure of the apex. The encouraging TA PLUG experimental results are being presented for the first time at the annual EACTS meeting 2012 in Barcelona.

The device is self-expanding and made from full-core biocompatible material. Ex-

Continued on page PB

Monday 29 October

08:00–17.00 **Registration**

Acquired Cardiac Disease 08:15 – 09:45

Professional Challenges

How to optimise coronary revascularization: planning and execution I

Rooms 116/117

Moderators: F. Mohr, Leipzig; J. Rich, Norfolk

08:15 **Assessing the lesion** *N van Mieghem (Rotterdam)*

08:30 **Treatment of complex coronary artery disease in patients with diabetes: Five-year results comparing outcomes of coronary artery bypass grafting and percutaneous coronary intervention in the SYNTAX study** *A. P. Kappetein[1], S. Head[1], M. Morice[2], A. Banning[3], P. Serruys[1], F. Mohr[4], K. Dawkins[5], M. Mack[5] ([1]Netherlands, [2]France, [3]United Kingdom, [4]Germany, [5]United States)*

Discussant: D. Taggart (Oxford)

08:45 **Five-year follow-up of drug-eluting stent implantation versus minimally invasive direct coronary artery bypass for left anterior descending artery disease: a propensity score analysis** *D. Glineur, C. Hanet, S. Papadatos, P. Noirhomme, G. El Khoury, P. Y. Etienne (Belgium)*

Discussant: P. Sergeant (Leuven)

09:00 **Preoperative SYNTAX score and graft patency after off-pump coronary bypass surgery** *T. Kinoshita, T. Asai, T. Suzuki (Japan)*

Discussant: V. Falk (Zürich)

09:15 **A real-world comparison of second-generation drug-eluting stents versus off-pump coronary artery bypass grafting in three-vessel and/or left main coronary artery disease** *G. Yi, H. Joo, K. Yoo (Republic of Korea)*

Discussant: F. Mohr (Leipzig)

09:30 **Distal anastomosis patency of the Cardica C-Port system versus the hand-sewn technique: a prospective randomized controlled study in patients undergoing coronary artery bypass grafting** *N. Verberkmoes, S. Wolters, J. Post, M. Soliman-Hamad, F. Ter Woorst, E. Berreklouw (Netherlands)*

Discussant: M. Glauber (Massa)

09:45 **Session ends**

Abstracts

Surgical remodelling of the left ventricle

Room 115

Moderators: A. Calafiore, Riyadh; R. Lorusso, Brescia

08:15 **Left ventriculoplasty for progressively deteriorated left ventricle with global akinesis due to ischaemic cardiomyopathy: Japanese surgical ventricular reconstruction group experience** *S. Wakasa, Y. Matsui (Japan)*

Discussant: L. Menicanti (Milan

08:30 **Experience, outcomes and impact of delayed indication for video-assisted wide septal myectomy in 69 consecutive patients with hypertrophic cardiomyopathy** *T. Heredia Cambra, L. Doñate Bertolín, A. M. Bel Minguez, M. Perez Guillen, F. J. Valera Martínez, J. A. Margarit Calabuig, F. Marín, J. A. Montero Argudo (Spain)*

Discussant: C. Simon (Bergamo)

08:45 **Impact of surgical ventricular restoration on cardiac function, ischaemic mitral regurgitation and long-term survival** *H. Fleming, R. Attia, J. Chambers, F. Shabbo (United Kingdom)*

Discussant: T. Isomura (Kanagawa)

09:00 **Preoperative regional left ventricular wall thickening with quantitative gated spect as a predictor of the mid-term surgical result of ischaemic and non-ischaemic cardiomyopathy** *S. Kubota, S. Wakasa, Y. Shingu, T. Ooka, T. Tachibana, Y. Matsui (Japan)*

Discussant: R. Jeganathan (Belfast)

09:15 **Durability of epicardial ventricular restoration without ventriculotomy** *A. Wechsler[1], J. Sadowski[2], B. Kapelak[2], K. Bartus[2], G. Kalinauskas[3], K. Rucinskas[3], R. Samalavicius[3], L. Annest[1] ([1]United States, [2]Poland, [3]Lithuania)*

Discussant: H. Reichenspurner (Hamburg)

09:30 **'One step' subendocardial implant of autologous stem cells during modified left ventricular restoration for ischaemic heart failure** *G. Stefanelli, F. Benassi, D. Gabbieri, G. D'Anniballe, D. Sarandria, C. Labia, G. Gioia (Italy)*

Discussant: J. Kluin (Utrecht)

09:45 **Session ends**

Continued on page 4

Cardiac: Abstract 08:15–09:45 Room 118/119

Severe intra-procedural complications after transcatheter aortic valve implantation: calling for a heart-team approach

Moritz Seiffert *Klinik für Allgemeine und Interventionelle Kardiologie; Universitäres Herzzentrum Hamburg, Hamburg, Germany*

Transcatheter aortic valve implantation (TAVI) has emerged rapidly. Despite unanimous recommendations and potentially fatal intraoperative complications, the heart-team approach is not comprehensively performed by all centers. Even more, some authors suggest that rare intraprocedural complications during TAVI requiring complex surgical treatment are associated with disproportionally high mortality and rather futile outcomes, therefore questioning the prerequisite of institutionalized departments of cardiology and cardiac surgery at sites performing TAVI.

At the University Heart Center Hamburg, TAVI is performed as a joint approach of cardiologists and cardiac surgeons in close collaboration with anesthesiologists and perfusionists to facilitate appropriate bail-out options in case of complications. In this analysis, we sought to characterize severe intraprocedural complications requiring immediate surgical or interventional bailout maneuvers out of a cohort of 458 consecutive TAVI procedures and evaluate outcomes.

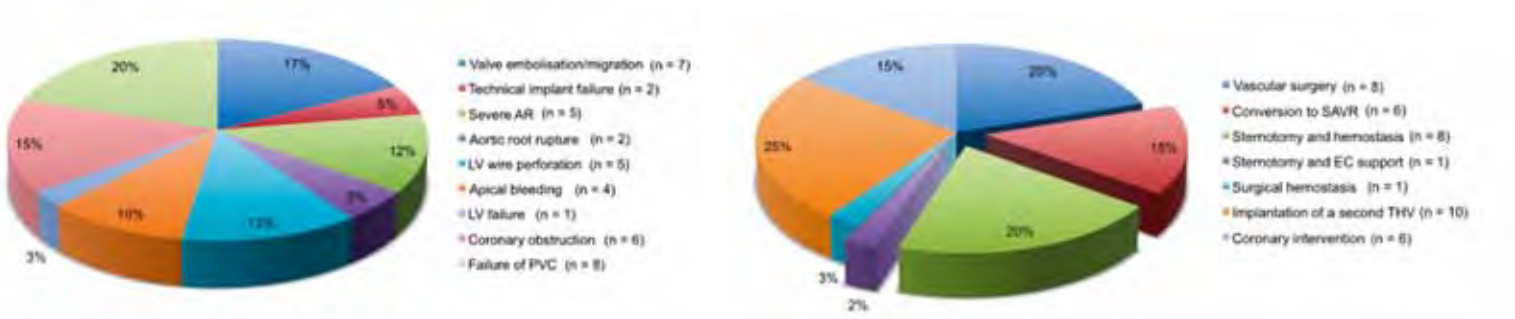
Overall, 35 of 458 patients (7.6%) experienced 40 major intraprocedural complications during TAVI, 13 (2.8%) requiring emergent conversion to surgery. Complications included valve embolization/migration (17%), severe aortic regurgitation (12%), and root rupture (5%), requiring immediate implantation of a second valve or conversion to surgical valve replacement (Figure). Sternotomy and surgical hemostasis was performed in 5 patients (13%) with left ventricular wire perforation and subsequent cardiac tamponade. Coronary obstruction (15%) required emergent percutaneous coronary intervention in 6 patients.

At 30 days, all-cause mortality was 31.4% in patients with intraprocedural complications and 38.5% in patients requiring surgical conversion. However, mid-term survival after 30 days and exercise tolerance in surviving patients were comparable to patients undergoing uncomplicated TAVI.

An interdisciplinary approach to TAVI facilitated bailout procedures accomplishing acceptable outcomes despite severe intraprocedural complications. Despite significant early mortality in these patients, mid-term survival after 30 days was comparable to the overall TAVI population. A multidisciplinary team with equal contribution by cardiologists and cardiac surgeons alike facilitated bailout procedures and accomplished acceptable outcomes in a heart-team effort. An excellent cooperation with anesthesiologists, perfusionists, and a prepared heart-lung-machine in the hybrid suite is of paramount importance.

Although a further decrease of intraprocedural complications can be anticipated with growing experience and improved technical preconditions in the future, a surgical and interventional safety net should be sustained in all centers performing TAVI procedures at this point in time. The sole performance of TAVI by cardiologists in a cath-lab with the lack of appropriate bail-out options in case of complications contravenes current guidelines and constitutes a dangerous approach in our opinion.

Severe intraprocedural complications during TAVI and subsequent bailout maneuvers



Severe intraprocedural complications (A) and subsequent bailout maneuvers (B), with the three indicated shares composing the conversion-to-surgery-group. AR, aortic regurgitation; EC, extracorporeal; LV, left ventricular; PVC, percutaneous vascular closure; TAVI, transcatheter aortic valve implantation; THV, transcatheter heart valve.

RVOT stenting

Continued from page 1

hypoplasia of the central pulmonary arteries that increases the operative risk with both BT shunt or complete repair. Furthermore, there are anatomical variants of Fallot's Tetralogy that increase the complexity of surgery – for example, Fallot/AVSD or anomalous origin of the left coronary. At Birmingham Children's Hospital we have promoted a selective approach to these patients where we have used RVOT stenting to secure better pulmonary bloodfow in preference to 'conventional' surgery.

We report the outcomes in 32 patients who had RVOT stenting in the setting of Fallot's tetralogy. In 20 the reason was cyanotic neonates/small infants with small pulmonary arteries and in 12 the indication was complex anatomy (eg fallot/AVSD) or co-morbidity such as chronic lung disease that merited delay of corrective surgery.

Stenting was not always successful and four patients had either failed stent deployment or had persistent cyanosis requiring early surgery. Overall, RVOT stenting improved arterial oxygen saturation from 72% to 92%. Furthermore, stenting resulted in growth of the central pulmonary arteries from a z-score of -1.3 to +0.1 on the left and -2.0 to -0.7 on the right.

To date, 15 of the remaining 28 stented patients have undergone subsequent complete repair, at a median of 210 days after stent placement. The remaining 13 remain well and are awaiting repair. There has been no operative mortality and, although removing the stent slightly increases operative duration and

Continued on page 6

European Society of Cardiology (ESC) and European Association of Cardio-Thoracic Surgeons (EACTS) joint guidelines make recommendations on TAVI

Based on interviews with Alec Vahanian (Bichat Hospital, Paris) and Ottavio Alfieri (San Raffaele Hospital, Milan)

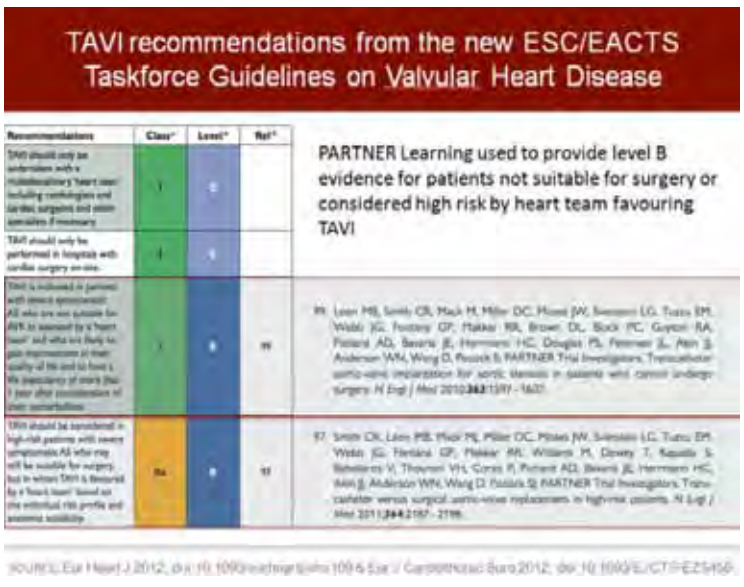
New guidelines on the Management of Valvular Heart Disease were released at the ESC in Munich, August 2012. They were created and endorsed by members of both the ESC and EACTS and are the result of a joint collaboration spearheaded by co-chairs Alec Vahanian and Ottavio Alfieri. Highlights will be presented on Tuesday morning at EACTS at 8:15 am. The new guidelines were prompted by new evidence, diagnostic methods, improved therapeutic options and, especially, the need to reinforce the importance of the Heart Team approach between cardiologists and surgeons.

TAVI adoption has been swift over the past few years for high-risk surgical patients with severe aortic stenosis (AS), as well as non-surgical candidates. In certain cases it has been performed on patients considered to be lower risk. Both Professors Vahanian and Alfieri emphatically stress that TAVI should not be performed in patients at intermediate risk and that care needs to be taken at both extremes of the spectrum—cases that may be considered futile, as well as those that may still be better served by surgery.

The recommended indications for TAVI in inoperable patients (Class I, Level B) were based primarily on the results of The PARTNER B Trial in the United States, a randomized, controlled trial using the Edwards SAPIEN balloon-expandable valve technology. In addition, data from some large, non-randomized European registries were reviewed. All the registries included patients with severe, symptomatic AS not suitable for aortic valve replacement (AVR) as assessed by a Heart Team and were likely to gain improvements to their quality of life, and expected to live more than one year.[1]

Professors Vahanian and Alfieri believe TAVI should also be considered in high-risk patients with severe symptomatic AS who may still be suitable for surgery, but in whom TAVI is favored by a Heart Team, based on the individual risk profile and anatomic suitability (Recommendation Class IIa, Level B). Here again this recommendation is largely based on the results of the PARTNER A randomized trial and numerous other large registries

Included in the recommendations is a clear list of absolute and relative contraindications to TAVI, including an inadequate annulus size, thrombus in the left ventricle, active endocarditis, plaques with mobile thrombi in the ascending aorta or arch, inadequate vascular access for a transfemoral/subclavian approach or a very low left ventricular ejection fraction.[2] The Task Force believes AVR remains suitable for patients with severe symptomatic AS, including those undergoing coronary artery bypass surgery or surgery of the ascending aorta or another valve. This could include those who are suitable for TAVI as well, but in whom surgery is favored by the Heart Team. Extreme care needs to be taken to only treat symptomatic patients if it is sure that the aortic disease is severe.

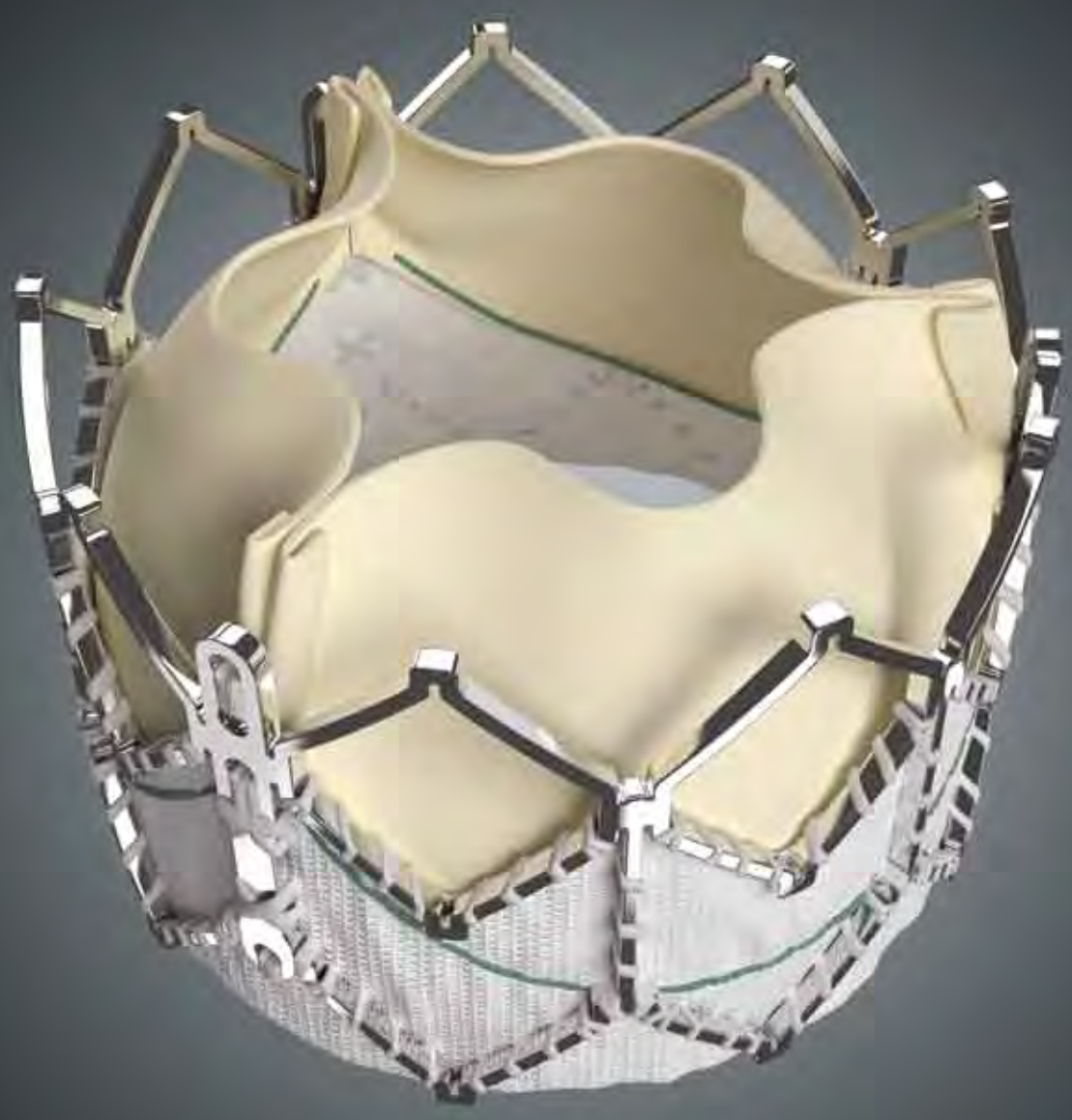


Stop by the Edwards Lifesciences booth for a copy of the new guidelines and a DVD of The PARTNER Trial results.

1. Footnote: ESC/EACTS Guidelines on the the Management of Valvular Heart Disease,Aug 2012 www.escardio.org/guidelines

2. See instructions for use for full prescribing information, including indications, contraindications, warnings, precautions, and adverse events on transcatheter heart valves.

Designed for Predictable Performance



Edwards SAPIEN XT Transcatheter Heart Valve

TRANSFEMORAL • TRANSAPICAL • TRANSAORTIC

For professional use. See instructions for use for full prescribing information, including indications, contraindications, warnings, precautions, and adverse events.

Edwards Lifesciences devices placed on the European market meeting the essential requirements referred to in Article 3 of the Medical Device Directive 93/42/EEC bear the CE marking of conformity.

Material for distribution only in countries with applicable health authority product registrations. Material not intended for distribution in USA or Japan. Indications, contraindications, warnings and instructions for use can be found in the product labeling supplied with each device.

Edwards Lifesciences
Irvine, USA | Nyon, Switzerland | Tokyo, Japan | Singapore, Singapore | São Paulo, Brazil
edwards.com

Edwards

Continued from page 2

Abstracts

The search for sinus rhythm

Room 114

Moderators: S. Benussi, Milan; M. Castella, Barcelona

08:15 **Effectiveness of biatrial pacing in reducing early postoperative atrial fibrillation after the maze procedure** *W. Wang[1], A. Hamzei[1], X. Wang[2] ([1]United States, [2]China)*
Discussant: S. Salzberg (Zürich)

08:30 **Minithoracotomy as a primary alternative for left ventricular lead implantation during cardiac resynchronization therapy: can the cardiac surgeon reduce the number of non-responders?** *S. Putnik, M. Matkovic, M. Velinovic, A. Mikic, V. Jovicic, I. Bilbija, M. Vraneš, G. Milašinovic (Serbia)*
Discussant: W. Wisser (Vienna)

08:45 **The association between early atrial arrhythmia and long-term success following surgical ablation for atrial fibrillation** *N. Ad, L. Henry, S. Holmes, S. Hunt (United States)*
Discussant: R. Almeida (Cascavel)

09:00 **Pacemaker dependency after isolated aortic valve replacement: do conductance disorders recover over time?** *H. Baraki, A. Ah Ahmad, S. Jeng-Singh, J. Schmitto, B. Fleischer, A. Martens, I. Kutschka, A. Haverich (Germany)*
Discussant: C. Vicol (Munich)

09:15 **Transcutaneous lead implantation connected to an externalized pacemaker in patients with implantable cardiac defibrillator/pacemaker infection and pacemaker dependency** *S. Pecha, Y. Yildirim, B. Sill, A. Aydin, H. Reichenspurner, H. Treede (Germany)*
Discussant: A. Lahti (Turku)

09:30 **Concomitant surgical atrial fibrillation ablation and event recorder implantation: better monitoring, better outcome?** *S. Pecha, T. Ahmadzade, T. Schäfer, H. Reichenspurner, F. Wagner (Germany)*
Discussant: B. Osswald (Bad Oeynhausen)

09:45 **Session ends**

Abstracts

Mitral medley

Room 112

Moderators: K. Sarkar, Kolkata; F. Casselman, Aalst

08:15 **Leaflet extension in rheumatic mitral valve reconstruction** *J. Dillon, M. A. Yakub (Malaysia)*
Discussant: S. Livesey (Southampton)

08:30 **Towards an integrated approach to mitral valve disease: implementation of an interventional mitral valve programme and its impact on surgical activity** *L. Conradi, M. Silaschi, H. Treede, S. Baldus, M. Seiffert, J. Schirmer, H. Reichenspurner, S. Blankenberg (Germany)*
Discussant: F. Maisano (Milan)

08:45 **Intraoperative transoesophageal echocardiography for predicting risk of systolic anterior motion after mitral valve repair for degenerative disease** *R. Varghese, S. Itagaki, P. Trigo, A. Anyanwu, G. Fischer, D. Adams (United States)*
Discussant: R. De Simone (Heidelberg)

09:00 **Long-term echocardiographic follow-up and quality of life after early surgery in asymptomatic patients with severe mitral valve regurgitation: a single-centre experience** *W. Van Leeuwen, S. Head, L. Van Herwerden, A. Bogers, A. P. Kappetein (Netherlands)*
Discussant: M. Borger (Leipzig)

09:15 **Is commissural closure for the treatment of mitral regurgitation durable? A long-term (up to 15 years) clinical and echocardiographic study** *M. De Bonis, E. Lapenna, M. Taramasso, M. C. Calabrese, N. Buzzatti, A. Pozzoli, T. Nisi, O. Alfieri (Italy)*
Discussant: L. Müller (Innsbruck)

09:30 **Management of moderate functional mitral regurgitation at the time of aortic valve surgery** *G. Freitas Coutinho, P. Correia, R. Pancas, M. Antunes (Portugal)*
Discussant: H. Vanermen (Aalst)

09:45 **Session ends**

Continued on page 6

Cardiac: Professional Challenges 08:15–09:45 **Room 116/117**

Title Preoperative SYNTAX score and graft patency after off-pump coronary bypass surgery

Takeshi Kinoshita *Shiga University of Medical Science, Otsu, Japan*

Objective: We examined the association between preoperative SYNTAX score and graft patency after off-pump CABG.

Methods: Of 912 consecutive patients undergoing isolated CABG (906 using the off-pump technique) between 2002 and 2011, 217 had CT angiography. Of this cohort, we studied 189 patients in whom preoperative SYNTAX scores were retrospectively obtained. The primary endpoint was graft occlusion on follow-up CT angiography. Graft occlusion was defined as absence of contrast agent along the course of the graft. In sequential grafts, each segment was analyzed as a separate graft. The secondary endpoint was a composite of major adverse cardiac and cerebrovascular event (MACCE), which was defined as cerebrovascular accident, non-fatal myocardial infarction, admission due to pump failure, and repeated revascularization. All arterial conduits, except for one right-side ITA, were harvested via the skeletonization technique and used as in-situ grafts.

Results

The mean interval from operation to angiogram was 4.7±2.4 years (range 0.8-10.0 years). Estimated 8-year graft patency of ITA-LAD, ITA-CX, SV-CX and/or PDA, and GEA-PDA were 97.4±1.5%, 89.3±4.2%, 86.5±6.7%, and 86.2±5.7%, respectively. Of the total 666 distal anastomoses, 27 in 21 patients were occluded. No significant difference was found in the preoperative SYNTAX scores between the 21 patients with graft occlusion (mean 35.7; range 15.0-51.5) and the 168 patients without graft occlusion (mean 36.6; range 17.0-54.5; unpaired t test p = 0.87). In univariate and multivariate logistic regression models, no significant association was found between graft occlusion and individual components of the SYNTAX score (Table). There was no significant difference in patients with low (≤22), intermediate (23-32), and high (≥33) SYNTAX scores in the cumulative rates of graft occlusion (log rank test, p = 0.88, Figure 1) and MACCE (log rank test, p = 0.86, Figure 2).

Conclusions

Preoperative SYNTAX score and its individual components are not associated with graft occlusion after off-pump CABG.

Takeshi Kinoshita

Logistic regression for association between graft occlusion and components of SYNTAX score

Graft occlusion	Yes	No	Univariate logistic regression		Multivariate logistic regression	
No. patients	21	168	Odd ratio(95% CI)	p	Odds ratio(95% CI)	p
Total occlusion,% of patients	7(33.3)	81(48.2)	0.54(0.21-1.40)	0.20	0.50(0.18-1.37)	0.18
Trifurcation,% of patients	4(19.0)	35(20.8)	0.89(0.28-2.83)	0.85	0.52(0.11-2.50)	0.41
Bifurcation,% of patients	9(42.9)	78(46.4)	0.87(0.35-2.16)	0.76	0.67(0.22-2.08)	0.49
Aorto-ostial lesion,% of patients	1(4.8)	8(4.8)	1.00(0.12-8.42)	0.99	1.16(0.12-11.53)	0.90
Severe tortuosity,% of patients	7(33.3)	57(33.9)	0.97(0.37-2.55)	0.96	1.11(0.39-3.13)	0.85
Lesion length >20mm,% of patients	15(71.4)	105(62.5)	1.50(0.55-4.07)	0.43	2.02(0.62-6.57)	0.24
Heavy calcification,% of patients	7(33.3)	72(42.9)	0.59(0.23-1.54)	0.28	0.69(0.25-1.88)	0.46
Thrombus formation,% of patients*	0	4(2.4)				
Diffuse disease,% of patients	6(28.6)	49(29.2)	0.97(0.36-2.65)	0.96	0.79(0.26-2.42)	0.68

Data are number of patients (%) *Thrombus formation not entered into logistic regression models as not detected in patients with graft occlusion

Figure 1 Cumulative rates of graft occlusion

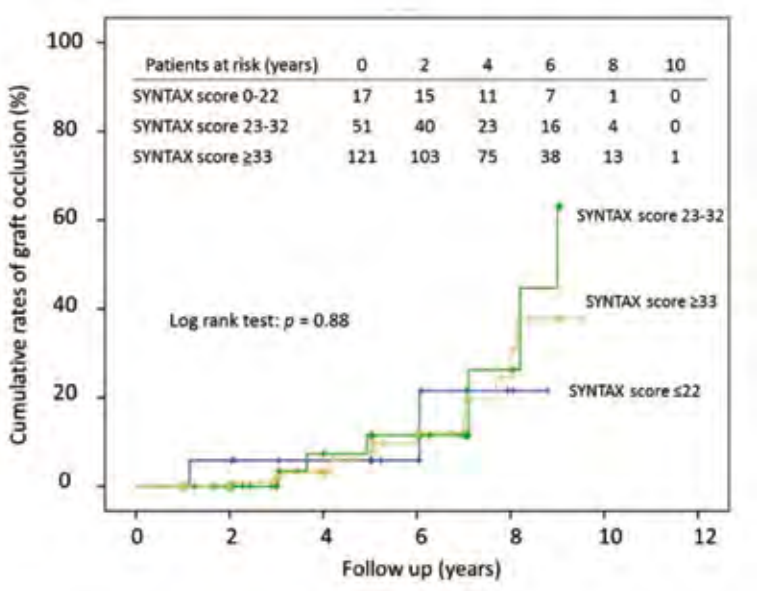
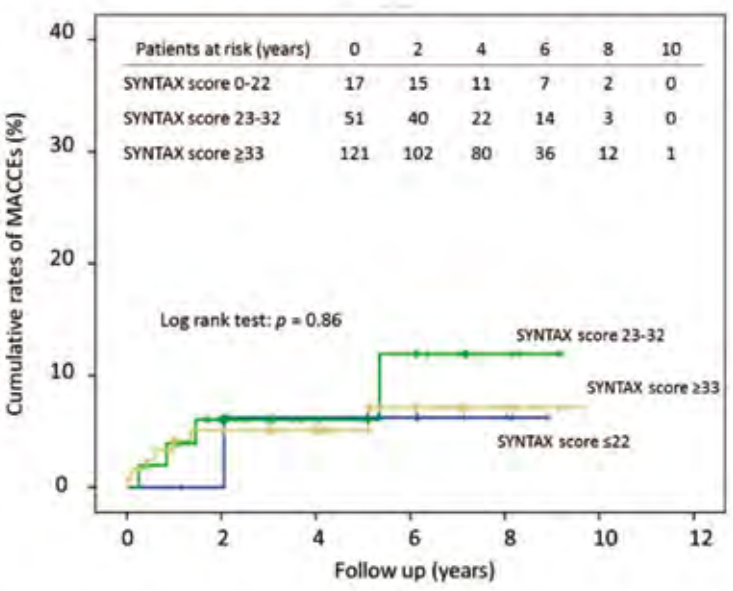


Figure 2 Cumulative rates of major adverse cardiac and cerebrovascular event



In occasion of the 26th EACTS Annual Meeting • Barcelona, Spain, 2012

SORIN GROUP

has the pleasure of inviting you to attend the Lunch Symposium:

The Future of Cardiac Surgery is MICS

Chairman: B. Gersak, *M.D., Ph.D., Prof., University Medical Center - Ljubljana, Slovenia*

CLINICAL ADVANTAGES OF MICS FOR THE REPLACEMENT WITH BIOPROSTHESIS: THE US EXPERIENCE WITH MITROFLOW VALVE

A. Rehman, *M.D., FACS, Sarasota Memorial Hospital - Sarasota, FL, USA*

PERCEVAL IN MICS, INNOVATION AND SUSTAINABILITY IN AVR TODAY AND TOMORROW

T.J.M. Fischlein, *M.D., Prof., Center of Cardiac Surgery, Klinikum Nuremberg - Nuremberg, Germany*

MINIMALLY INVASIVE VERSUS TRADITIONAL APPROACH FOR MITRAL VALVE REPAIR: FEASIBILITY AND EFFECTIVENESS OF MEMO 3D

G. Esposito, *M.D., Humanitas Gavazzeni Clinic - Bergamo, Italy*

MAKE SURE YOU ATTEND THIS INFORMATIVE LUNCH SYMPOSIUM

Room 114

Monday, October 29th • 12:45 - 2:00 pm

SORIN GROUP
AT THE HEART OF MEDICAL TECHNOLOGY

Continued from page 4

Abstracts

08:15 New ideas in transcatheter aortic valve replacement

Rooms 118/119

Moderators: T. Walther, Bad Nauheim; C. R. Smith, New York

08:15 **Transapical access closure: the tap plug device** *C. Huber, H. Brinks, V. Göber, F. Nietlisbach, P. Wenaweser, B. Meier, L. Englberger, T. Carrel (Switzerland)*
Discussant: S. Bleiziffer (München)

08:30 **Severe intra-procedural complications after transcatheter aortic valve implantation: calling for a heart-team approach** *M. Seiffert, L. Conradi, R. Schnabel, J. Schirmer, S. Blankenberg, H. Reichenspurner, S. Baldus, H. Treede (Germany)*
Discussant: L. Harling (London)

08:45 **Transapical versus transfemoral transcatheter aortic valve implantation: outcome according to standardized endpoint definitions by the Valve Academic Research Consortium** *S. Salizzoni, M. La Torre, F. Giordana, C. Moretti, P. Omede, G. Ferraro, M. D'Amico, M. Rinaldi (Italy)*
Discussant: N. M. D. A. van Mieghem (Rotterdam)

09:00 **Initial clinical results of the Braile Inovare transcatheter aortic prosthesis** *J. H. Palma, D. Gaia, E. Buffolo, C. B. Ferreira, J. A. Souza, G. Agreli (Brazil)*
Discussant: H. Treede (Hamburg)

09:15 **Systematic transaortic approach for transcatheter aortic valve implantation: a valid alternative to transapical access in patients with no peripheral vascular option. One year single-centre experience** *M. Romano, K. Hayashida, T. Lefèvre, T. Hovasse, B. Chevalier, D. Le Houérou, A. Farge, M. Morice (France)*
Discussant: J. Grünenfelder (Zürich)

09:30 **European experience of direct aortic transcatheter aortic valve implantation with a self-expanding prosthesis: evidence of a significant learning curve** *G. Bruschi[1], M. Jahangir[2], U. Trivedi[2], N. Moat[2] ([1]Italy, [2]United Kingdom)*
Discussant: H. Amrane (Leeuwarden

09:45 **Session ends**

Professional Challenges

How to optimize coronary revascularization: planning and execution II

Rooms 116/117

Moderators: N. M. D. A. van Mieghem, Rotterdam; M. Mack, Dallas

10:15 **Difference between the European and US guidelines** *M. Mack (Dallas)*

10:30 **Impact of statin use on clinical outcomes after cardiac surgery: a systematic review of studies, with meta-analysis of over 90,000 patients** *O. Liakopoulos, S. Stange, E. Kuhn, A. Deppe, I. Slottosch, Y. Choi, T. Wahlers (Germany)*
Discussant: M. Thielmann (Essen)

10:45 **Mortality risk and causes of death in coronary artery bypass surgery patients with pre- and postoperative atrial fibrillation: a 12-year follow-up** *E. Fengsrud, A. Englund, A. Ahlsson (Sweden)*
Discussant: P.P. Paulista (Sao Paulo)

11:00 **Comparison of heart-type fatty acid binding protein and cardiac troponin I for early detection of myocardial infarction after coronary bypass surgery** *S. Pasa, D. Wendt, M. Hösel, D. Dohle, K. Pilarczyk, H. Jakob, M. Thielmann (Germany)*
Discussant: M. Sousa Uva (Lisbon)

11:15 **Should moderate ischaemic mitral regurgitation be corrected at the time of coronary artery bypass grafting? Answer from a 10-year follow-up** *V. Shumavets, Y. Ostrovski, A. Shket, A. Janushko, S. Kurganovich, I. Grinchuk, N. Semenova, O. Jdanovich (Belarus)*
Discussant: A. Rastan (Rotenburg)

11:30 **Intensive care unit readmission after cardiac surgery: predictors and consequences** *U. Boeken, J.-P. Minol, A. Assmann, A. Mehdiani, P. Akhyari, A. Lichtenberg (Germany)*
Discussant: B. Rylski (Freiburg)

11:45 **Session ends**

Continued on page 8

Thoracic: Abstract 08:15–09:45 **Room 133/134**

Preoperative CT hook-wire localisation

Thoracoscopic resection for ground-glass opacity pulmonary lesions: results from a prospective analysis

Ting Ye *Chief, Department of Thoracic Surgery, Shanghai Cancer Center, Fudan University,*

Haiquan Chen *Department of Oncology, Shanghai Medical College, Fudan University, Shanghai, China*

More and more single pulmonary nodules (SPNs) especially those featured with ground glass opacity (GGO) are detected nowadays with the wide application of high resolution CT. Persistent GGO nodules always indicate the malignant or premalignant diseases like atypical adenoid hyperplasia (AAH), adenocarcinoma in situ or minimal invasive adenocarcinoma (MIA) which need surgical resection. However, pure or subsolid GGO lesions are hard to be palpated or recognized during thoracoscopic resection. On the other hand, preoperative CT-guided hook-wire localization has been widely used in video-assisted thoracic surgical resection for SPNs these years. So we designed the study to prospectively evaluate the application of preoperative CT-guided hook-wire localization for thoracoscopic resection of pure GGO nodules and mixed GGO lesions with a solid component less than 50%.

From April 2008 to June 2011, 87 patients including 25 males and 62 females with a mean age of 55.23±10.00 year old and 93 GGO lesions including 53 pure GGOs and 40 subsolid GGOs were enrolled. The mean size of these nodules was 11.03±4.76 *9.15±3.68mm. And the mean depth of the lesions (vertical distance from the nodule to pleural surface) was 11.59±8.00mm. We performed 93 hook-wire localizations for all the nodules. The mean depth of needle insertion was 26.80±1.18mm. And seventy-six needle localizations were near the lesion while seventeen procedures penetrated the lesion. The mean time of the procedure was 15.36±5.10 minutes. All hook-wire localizations were successful. There were sixteen asymptomatic hemorrhages and five pneumothoraxes which did not need clinical interventions. The complication rate was 22.58%. We successfully did ninety-three wedge resections and thirty-seven lobectomies. The mean duration of the wedge resection was 15.14±2.65 minutes. One operation was converted to thoracotomy because of the pleural adhesion. There were two complications including one alveolar pleural fistula case and one post-operative acataleptic thoracic hemorrhage case after lobectomies, which were both successfully managed by expectant treatment. And the patient with thoracic hemorrhage discharged from hospital 22 days after operation. The mean postoperative in-hospital time was 6.26 days. Final pathological results showed 29 invasive adenocarcinomas; 26 adenocarcinomas in situ; 16 minimal invasive adenocarcinomas, 10 atypical adenoid hyperplasia and six alveolar epithelium hyperplasia and six inflammations.

Ting Ye

Haiquan Chen

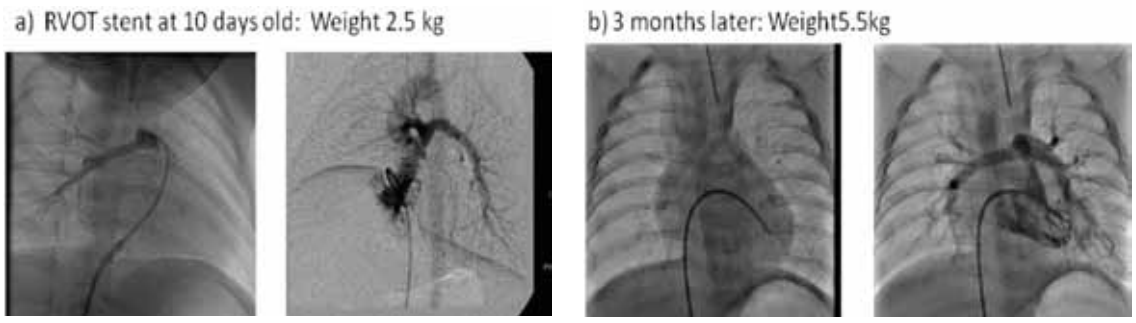
Results in this study showed the usefulness and superiority of the hook-wire localization for pure and mixed GGO lesions in terms of its 100% successful localization and resection rate and low incidence of related complications. We think the need for preoperative hook-wire localization will remain as long as the application of video-assisted thoracic surgery for pulmonary lesions with dominant ground glass opacity features.

RVOT stenting

Continued from page 2

need for trans-annular patch (80%) this is not significantly different from our standard practice.

We feel that selective use of RVOT stenting can be a useful adjunct to the management of complex variants of Fallot's Tetralogy. The technique reduces the need for high risk neonatal surgery and results in the growth of diminutive pulmonary arteries.



CABG Comes with Comparable Stroke to PCI If the Aorta Is Not Clamped

S. Salzberg, M. Emmert, J. Grünenfelder, A. Plass and V. Falk
University Hospital Zurich, Switzerland

Surgical revascularization remains the treatment of choice for complex 3-vessel coronary disease, left main coronary artery involvement or diabetes mellitus. However, coronary artery bypass grafting (CABG) is limited by concern about the higher stroke rate compared with PCI. Reports of inferior neurological outcomes for CABG vs. PCI have primarily resulted from studies in which conventional on-pump CABG techniques were used, rather than off-pump techniques, aortic no-touch strategies or even the combination of both.

A growing body of evidence supports clampless off-pump approaches to surgical revascularization to minimize neurologic injury. By eliminating aortic cross-clamping required for cardiopulmonary bypass, off-pump coronary artery bypass (OPCAB) results in a lower incidence of stroke compared to conventional CABG, particularly when performed in combination with complete in-situ grafting (double internal mammary artery and/or T- or Y-Grafting). While off-pump in situ grafting has been proposed as the 'standard of care' to reduce neurological complications, it may not be applicable for every patient. In many cases to obtain complete revascularization the use of free grafts (arterial or venous) requiring proximal anastomosis is necessary. In these situations, proximal anastomosis can be enabled without a partial clamp by using the HEARTSTRING device (MAQUET, San Jose, CA, United States).

In a propensity-matched analysis of 4,314 patients undergoing surgical revascularization at the University Hospital Zurich, stroke incidence was significantly lower when HEARTSTRING was used to perform proximal anastomoses during OPCAB rather than the partial camp. Of note, the stroke rate for the HEARTSTRING group was comparable to that of patients who underwent completely no-touch in situ grafting (Figure 1).

The use of the HEARTSTRING device can be safely implemented into routine clinical practice with little learning curve and significantly minimizes the occurrence of stroke and other neurological complications compared with partial- or side bite clamping. The combination of OPCAB and clampless strategies either using complete in situ grafting techniques or clampless devices such as HEARTSTRING for proximal anastomosis reduces stroke to levels comparable to PCI, representing a significant advance over conventional on-pump CABG (Figure 2)

While aortic cross clamping (A) during standard on-pump CABG as well as partial clamping using a side-bite clamp during OPCAB (B) are well established as important risk factors for stroke, a clampless technique for proximal anastomosis (C) applying the HEARTSTRING device is an effective tool for stroke reduction. Only by these means can stroke rates of CABG become similar or even lower than for PCI.

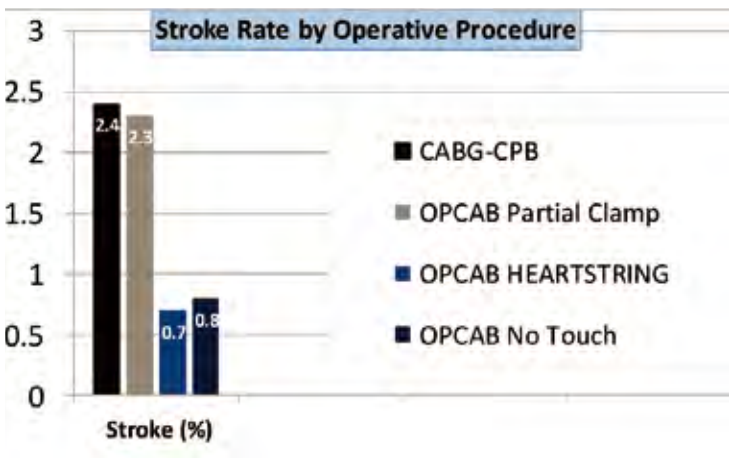


Figure 1 – Stroke Rate by Operative Procedure in 4314 CABG Patients

References

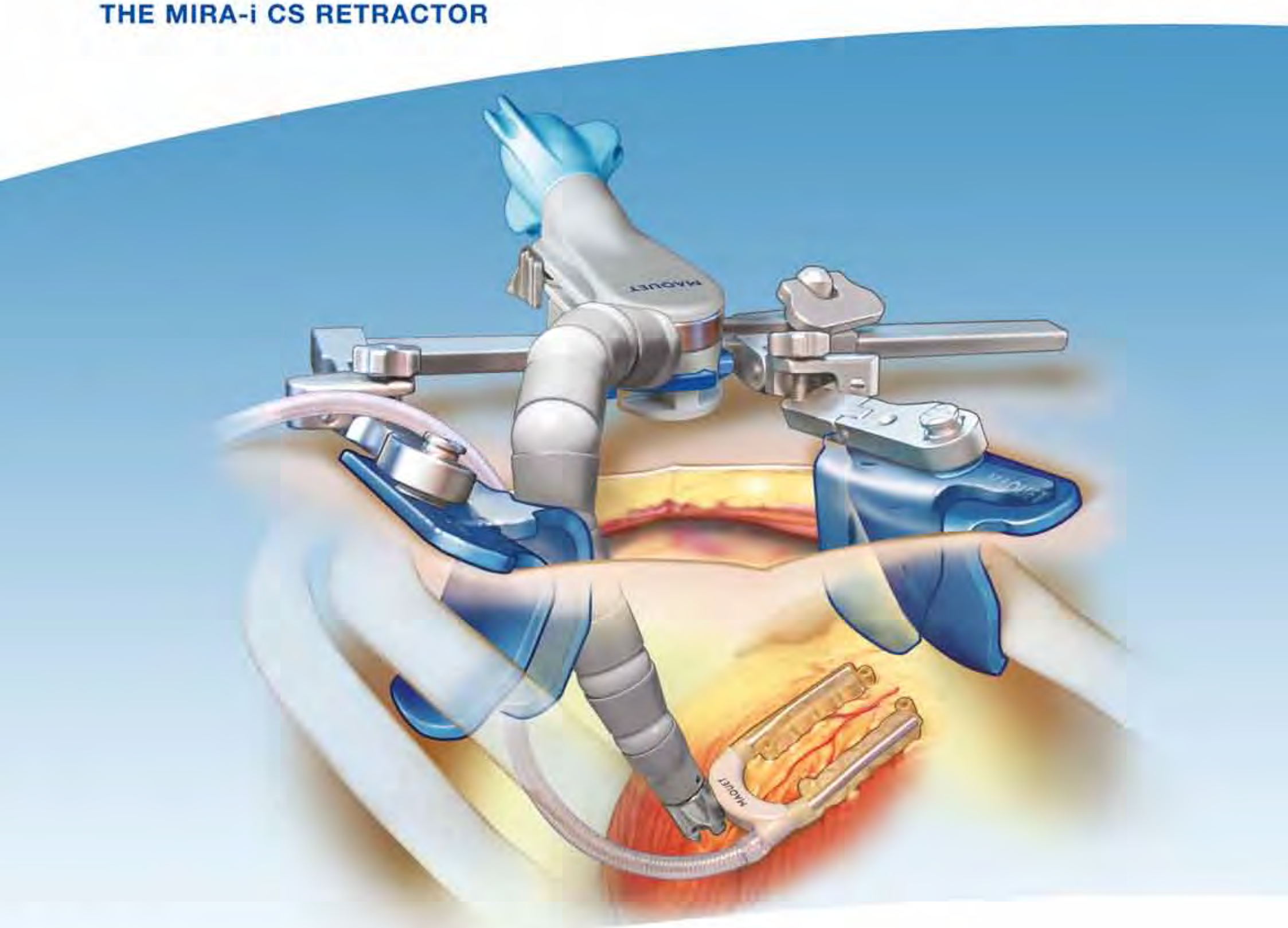
Emmert MY, Seifert B, Wilhelm M, Grünenfelder J, Falk V, Salzberg SP. Aortic no-touch technique makes the difference in off-pump coronary artery bypass grafting. J Thorac Cardiovasc Surg. 2011 Dec;142(6):1499-506.

Emmert MY, Salzberg SP, Seifert B, Scherman J, Plass A, Starck CT, Theusinger O, Hoerstrup SP, Grünenfelder J, Jacobs S, Falk V. Clampless off-pump surgery reduces stroke in patients with left main disease. Int J Cardiol. 2012 Jun 21. [Epub ahead of print].

Figure 2 – Alternative Approaches to Proximal Anastomosis

MINIMAL INCISION. UNSURPASSED ACCESS.
A PIVOTAL BREAKTHROUGH...
THE MIRA-i CS RETRACTOR

MAQUET
GETINGE GROUP



MAQUET Introduces an Innovative Retractor System, for Minimally Invasive CABG Procedures.

MIRA-i CS Retractor has a patented Pivot Mechanism that allows blades to tilt up to 30° – maximizing access, instrument maneuverability and visibility without increasing the incision length.

THREE THORACOTOMY BLADE SIZES

BLADES TILT UP TO 30°

TWO IMA BLADE SIZES

Visit us in Barcelona at EACTS Booth #86 October 27-31st to see the MIRA-i CS Retractor!

MAQUET Cardiovascular LLC
45 Barbour Pond Drive
Wayne, NJ 07470
Phone: +1 (408) 635-6800
Phone Toll Free: +1 (888) 880-2874
Fax: +1 (408) 635-0717
Fax Toll Free: +1 (888) 899-2874
CardiacSurgery@maquet.com
www.maquet.com

MCV00011477 Rev A

Continued from page 6

Abstracts

Mechanical support of the circulation

Room 115

Moderators: J. R. Pepper, London; G. Gerosa, Padua

10:15 **Who benefits from early ventricular assist device implantation?** *T. Komoda, T. Drews, T. Krabatsch, H. Lehmkuhl, R. Hetzer (Germany)*
Discussant: L. Martinelli (Milan)

10:30 **The CardioWest total artificial heart as a bridge to transplantation: current results at La Pitié hospital** *M. Kirsch, A. Nguyen, C. Mastroinai, M. Pozzi, S. Varnous, P. Léger, A. Pavié, P. Leprince (France)*
Discussant: M. Iafrancesco (Birmingham)

10:45 **Long-term results with a total artificial heart: is it prime time for destination therapy?** *G. Gerosa[1], G. Torregrossa[1], P. Leprince[2], F. Beyersdorf[3], R. Hetzer[3], J. Gummert[3], D. Duveau[2], J. Copeland[4] ([1]Italy, [2]France, [3]Germany, [4]United States)*
Discussant: J. B. Kim (Seoul)

11:00 **Left ventricular/biventricular assist device support in children with the Berlin Heart EXCOR: earlier indication is mandatory** *A. Bortolami, M. Padalino, A. Gambino, G. Toscano, G. Feltrin, V. Vida, G. Stellin, G. Gerosa (Italy)*
Discussant: V. Tsang (London)

11:15 **Circulatory support in elderly chronic heart failure patients using the Circulite Synergy system** *A. Barbone[1], F. Rega[2], D. Ornaghi[1], E. Vitali[1], B. Meyns[2] ([1]Italy, [2]Belgium)*
Discussant: A. Loforte (Bologna)

11:30 **Survival results with an intrapericardial third-generation centrifugal assist device: an INTERMACS-adjusted comparison analysis** *A. Dell'Aquila, D. Schlarb, B. Ellger, A. Hoffmeier, S. Martens, J. Sindermann (Germany)*
Discussant: M. Grimm (Innsbruck)

11:45 **Session ends**

Abstracts

10:15 **The future of transcatheter mitral valve repair**

Room 114

Moderators: R. Haaverstad, Bergen; H. Treede, Hamburg

10:15 **State-of-the-art with the MitraClip procedure** *F. Maisano (Milan)*

10:22 **Residual mitral valve regurgitation after percutaneous mitral valve repair with the MitraClip system: impact on follow-up outcome** *G. D'Ancona, L. Paranskaya, S. Kische, H. Ince (Germany)*
Discussant: O. Alfieri (Milan)

10:37 **Mitral valve repair using multiple MitraClips: perioperative and short-term results using the "zipping" technique** *S. Kische, G. D'Ancona, L. Paranskaya, I. Turan, H. Ince (Germany)*
Discussant: H. Vanermen (Aalst)

10:52 **Percutaneous or surgical mitral valve repair for functional mitral regurgitation: comparison of patient characteristics and clinical outcomes** *L. Conradi, H. Treede, E. Lubos, M. Seiffert, J. Schirmer, S. Blankenberg, S. Baldus, H. Reichenspurner (Germany)*
Discussant: A. Hensens (Enschede)

11:07 **Clinical outcomes through six months in patients with degenerative mitral regurgitation treated with the MitraClip device in the ACCESS-Europe phase I trial** *F. Maisano[1], O. Franzen[2], S. Baldus[3], J. Hausleiter[3], C. Butter[3], U. Schäefer[3], G. Pedrazzini[4], W. Schillinger[3] ([1]Italy, [2]Denmark, [3]Germany, [4]Switzerland)*
Discussant: H. Treede (Hamburg)

11:22 **MitraClip therapy in heart failure patients with functional mitral regurgitation: one year results in 75 high-risk patients in a single-centre experience** *M. Taramasso, P. Denti, M. Cioni, G. La Canna, N. Buzzatti, O. Alfieri, A. Colombo, F. Maisano (Italy)*
Discussant: M. Haensig (Leipzig)

11:30 **MVARC Guidelines: how to report on outcomes in mitral valve interventions** *S. Head (Rotterdam)*

This session is supported with an unrestricted educational grant from Abbott Vascular International BVBA

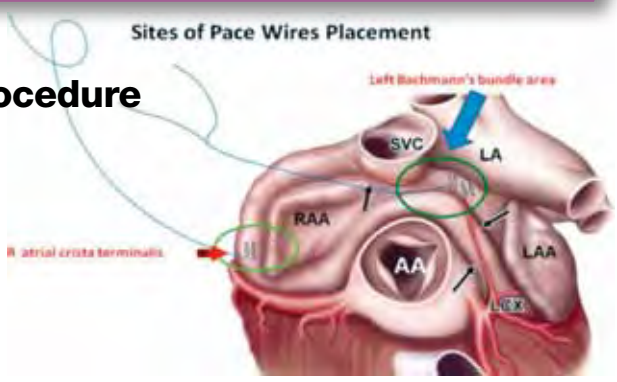
11:45 **Session ends**

Continued on page 10

Cardiac: Abstract 08:15–09:45 Room 114

Effectiveness of biatrial pacing in reducing early postoperative atrial fibrillation after the maze procedure

William Wang *Scripps Memorial Hospital, La Jolla, California, USA*



Early postoperative recurrent atrial fibrillation (AF) is the most common clinically encountered arrhythmia after mitral valve surgery concomitant with Maze procedure. Up to 43% of the cases present with AF during postoperative days two to five. These tachyarrhythmias are recognized as a major cause of perioperative morbidity.

The management of these arrhythmias has been shown to significantly extend the length of hospitalization and associated cost. Pharmacological control is the first line of therapy, but AF may be associated with low success rates, high recurrence rates, or patient intolerance. Thus, there is considerable interest in non-pharmacological therapy as a way to maintain sinus rhythm. Continuous overdrive biatrial pacing was found to be effective in promoting sinus rhythm and in reducing the incidence of AF after open heart surgery.

Between 2002 and 2010, 240 patients undergoing mitral± tricuspid valve surgery concomitant with the Maze procedure were randomized into three equal groups: group I using overdrive biatrial pacing, group II utilizing single atrial pacing and group III without pacing. Results show the incidence of recurrent postoperative atrial fibrillation was significantly less in the group I with 9 of 80 patients (11%) incurring atrial fibrillation compared with 23 of 80 patients (28%) in the group II (P <.01) and 29 of 80 patients in the group III (p<0.1). The length of hospital stay and the mean costs of hospital stay were significantly lower in the biatrial pacing group (P <.05).

We concluded that biatrial overdrive pacing is well tolerated and more effective in preventing the early recurrence of atrial fibrillation after the Maze procedure.

Vascular: Professional Challenges 08:15–09:45 Room 113

Aortic arch reoperation: a single centre experience of early and late outcome in 57 consecutive patients.

Monica Moz *Department of Cardiac Surgery. Heart Centre, University of Leipzig. Leipzig, Germany*

Monica Moz

Aortic arch reoperation following previous ascending aorta surgery (AAR)±aortic arch is a technically complex procedure. Longer survivals after the primary procedure, an ageing population, improved knowledge in the management of reoperation have contributed to an increase of these procedures. Redo-surgery of aortic arch carries a higher early mortality-morbidity than first-time procedures. We retrospectively analysed the results at our Institution.

Between January 1995 and December 2011, 1,022 patients underwent AAR± aortic arch surgery at HZL. 57 patients (5.5%), who previously received aortic surgery, underwent aortic arch surgery.

The indications: aortic arch aneurysm 50%, residual aortic dissection 38%, vascular graft infection 9% and a patient with end-stage DCM. The mean interval time between the previous surgery: 7.6±7 years for aortic aneurysm, 4.4±4 years for type A aortic dissection (p=0.09).

Regarding cerebral protection, SACP with HCA was used in 39 patients (68%): UACP in 11, BACP in 28. In 18 patients (46%) HCA was performed with a mean temperature of 22°C. The 30-day mortality: 8.8% (n=5). Three patients died in tabula (two because of LCO, one due to massive IMA). One patient died due to massive cerebral edema after seven days, another after 23 days due to sepsis. IRA appeared in five (9%), stroke in nine patients (16%) with permanent deficits in three. The mean survival time: 5.5±0.5 years. Overall estimated survival: 77±0.3%, 76±0.4%, 75±0.6% at one, three and five years. Survival for patients with aortic dissection for one operation was significant worse compared with aortic aneurysm (log rank p=0.016).

Univariate analyze revealed an association between aortic dissection (OR 9.2, p<0.01), emergency indications (OR 8.2, p=0.02), PVD (OR 5.5, p=0.02) and in-hospital mortality: In the Cox regression model, aortic dissection at the time of the first procedure was the single independent risk factor (OR 3.7, p =0.01).

Many different aspects need to be considered for the success of these procedures.

- Pre-operative evaluation with CT scan images, with 3D reconstruction, allows developing a surgical strategy.
- The selection of arterial cannulation site. We believe that the axillary cannulation provides an excellent visibility of the surgical field, antegrade flow into the aortic arch and represents a "no-touch" technique and prevents dislodgement of emboli into the brain.
- The incidence of neurological events. BACP permits longer times of HCA. During SACP there is the risk of cerebral embolism associated with arch-vessel cannulation. The continuous monitoring of cerebral oxygenation has been developed for evaluation of the adequacy of blood supply during the HCA. We routinely use the Somanetics Invos in aortic surgery.
- The "en-bloc" or "separate graft" techniques for arch vessels reimplantation. We use the separate implantation in aortic dissection which involves the arch-vessels and in presence of calcified plaques that make direct anastomosis problematic.
- Patients with Marfan syndrome require a careful follow-up after the first operation, important to determine any late aortic events and the correct timing of reoperation.

In conclusion, despite the complexity of these patients, the difficulty to reoperation and multiple intra-operative aspects to consider, this surgery can be performed with a low mortality-morbidity rate.

Intra-operative data	
CPB time minutes (mean ± SD)	251.2±84
Cross clamp time	99.4±60.4
Circulatory arrest time minutes (mean ± SD)	28±22
Cannulation method (n,%)	
Femoral artery	27 (47%)
Axillary artery	30 (53%)
Surgery data	
Hemi-arch replacement (n,%)	27 (47%)
Total arch replacement (n,%)	**30 (53%)**
Elephant Trunk	16
Frozen Elephant Trunk	6
(Jotec E-vita open plus, Jotec GmbH, Germany)	
Reimplantation of arch vessel (n,%)	
En-bloc technique	22 (73%)
Separate graft tecnique	8 (27%)
Bentall procedure (n,%)	**20 (35%)**
Homograft	4 (7%)
Thoracoabdominal aorta replacement (n,%)	**9 (16%)**

Functional Tricuspid regurgitation: Do we follow the guidelines?

Professor Ben Bridgewater *Department of Cardiothoracic Surgery, University Hospital of South Manchester NHS Foundation Trust*

Functional tricuspid regurgitation is typically secondary to left-sided valve dysfunction and is associated with lower survival. The European guidelines on valvular heart disease recommend that patients undergoing left sided valve interventions should undergo tricuspid surgery if they have severe tricuspid regurgitation (TR) or mild/moderate TR with a dilated tricuspid annulus, ≥ 40mm.

So does the surgical community follow these guidelines? Data from Dreyfus and Van de Veire suggests that around half of the patients undergoing mitral repair should undergo concomitant tricuspid surgery. Analysis of the Society for Cardiothoracic Surgery of Great Britain and Ireland database shows that an increasing number of patients are undergoing combined mitral and tricuspid surgery, but in the most recent year of analysis less than 20% of patients undergoing mitral repair had a tricuspid intervention. It is unlikely that this is purely a UK phenomenon.

So why do surgeons not follow the guidelines? The data contributing to the guidance are small, single-centre studies. Some surgeons may have the view that successful mitral repair surgery improves quality of life and life expectancy to that of the age-matched healthy population and that tricuspid repair may not be necessary. Does tricuspid repair increase operative risk? As with anything in surgery it is somewhat counter-intuitive that adding extra procedures to any operation does not increase risk but this may be true for functional tricuspid repair according to the recently updated ESC/EACTS Guidelines. Furthermore, around 1/3rd of patients undergoing left sided surgery who have no significant TR at the time of intervention will develop important TR during follow-up, and these patients have poor long-term outcomes and a high perioperative mortality in the case of subsequent tricuspid surgery. The difficulty of assessment and evaluation of tricuspid regurgitation may also be important: as a ventricular and valvular disease, both regurgitation and tricuspid annulus dilation should be considered to fully assess the valve.

Mitral repair has long been a subspecialist interest in some parts of the world where in others it forms part of general cardiac surgeon's practice. If only small volumes of mitral surgery are undertaken we know that mitigates against the likelihood of repair procedures, and it is likely that it also decreases the chance of appropriate intervention on the tricuspid valve at the same time (and 'appropriate' includes when to operate as well as what type of procedure to perform; contemporary litreature has demonstrated superior outcomes for ring repair vs. suture annuloplasty).

The tricuspid valve is still not well understood due to complex interactions with right ventricular function, pulmonary artery pressure and circulatory loading. To change clinical practice further will require better pathophysiological understanding of the right heart, more clinical studies (preferably randomized) demonstrating beneficial effects of tricuspid annuloplasty for defined groups, further education for the surgical community, and rigorous audit of practice against accepted best practice standards.

THE PHYSIO COMMITMENT

TO ADVANCING TRICUSPID REPAIR

Caption

CARPENTIER-EDWARDS

PHYSIO TRICUSPID

ANNULOPLASTY RING

Invented by Alain F. Carpentier, MD, PhD

Progress Confidently

For professional use. See instructions for use for full prescribing information, including indications, contraindications, warnings, precautions, and adverse events.

Edwards Lifesciences devices placed on the European market meeting the essential requirements referred to in Article 3 of the Medical Device Directive 93/42/ECC bear the CE marking of conformity.

Edwards Lifesciences
Irvine, USA | Nyon, Switzerland | Tokyo, Japan | Singapore, Singapore | São Paulo, Brazil

Edwards

Continued from page 8

Abstracts

Aortic valve repair at the crossroads

Room 112

Moderators: E. Lansac, Paris; H. Schäfers, Hamburg/Saar

10:15 **Does the geometric orientation of the aortic neoroot in patients with raphed bicuspid aortic valve disease undergoing valve repair plus root reimplantation affect valve function?** *P. Vallabhajosyula, T. Wallen, C. Komlo, W. Szeto, J. Bavaria (United States)*
Discussant: G. El Khoury (Brussels)

10:30 **Long-term outcome of valve repair for concomitant aortic and mitral insufficiency: setting a new standard of care** *H. Vohra[1], R. Whistance[2], L. Dekerchove[1], D. Glineur[1], P. Noirhomme[1], G. El Khoury[1] ([1]Belgium, [2]United Kingdom)*
Discussant: M. Borger (Leipzig)

10:45 **Impact of annuloplasty in bicuspid aortic valve repair: valve-sparing reimplantation is superior to subcommissural annuloplasty** *E. Navarra, L. De Kerchove, D. Glineur, P. Astarci, P. Noirhomme, G. El Khoury (Belgium)*
Discussant: M. Nosal (Bratislava)

11:00 **Aortic valve reconstruction with autologous pericardium for dialysis patients** *I. Kawase, S. Ozaki, H. Yamashita, Y. Nozawa, S. Uchida, T. Matsuyama, M. Takatoh, S. Hagiwara (Japan)*
Discussant: E. Lansac (Paris)

11:15 **Functional aortic annulus remodelling using a handmade prosthetic ring improves outcomes in aortic valve repair** *K. Fattouch, S. Castrovinci, G. Murana, G. Nasso, F. Guccione, P. Dioguardi, G. Bianco, G. Speziale (Italy)*
Discussant: E. Lansac (Paris)

11:30 **Prospective analysis of long-term results of aortic valve repair and associated root reconstruction** *M. Jasinski, R. Gocol, M. Malinowski, D. Hudziak, M. Deja, S. Wos (Poland)*
Discussant: S. Leontyev (Leipzig)

11:45 **Session ends**

Focus Session

10:15 **Antiplatelet therapy in 2012: impact on cardiovascular surgical procedures**

Rooms 118/119

Moderators: J. B. Grau, Ridgewood; D. Taggart, Oxford

10:15 **Comparative analysis of available antiplatelet therapies in current clinical management: what agents to choose from and why** *H. Reichenspurner (Hamburg)*

10:30 **Applying current guidelines on antiplatelet therapy prior to coronary artery bypass grafting: What to do in the setting of previous percutaneous coronary intervention? What can be improved?** *A. P. Kappetein (Rotterdam)*

10:45 **Should we place our post coronary artery bypass graft patients on antiplatelet drugs? Weighing the benefits and the complications through evidence-based research** *I. George (Columbia)*

11:00 **Impact of pharmacogenetics in the clinical management of antiplatelet therapy** *J. Quackenbush (Boston)*

11:15 **Antiplatelet therapy in high-risk patients and in those on warfarin therapy** *E. Rodriguez (Greenville)*

11:30 **New frontiers in antiplatelet therapy: where we are and where we are going from here** *D. Glineur (Brussels)*

This session is supported with an unrestricted educational grant from AstraZeneca

11:45 **Session ends**

Abstracts

10:15 **Heart transplants: the most effective treatment for end-stage heart failure**

Rooms 120/12

Moderators: Ö. Friberg, Örebro; J.L. Pomar, Barcelona

10:15 **Evolution of recipient and donor profiles in cardiac transplantation: single-centre ten-year experience** *C. D'Alessandro, M. Laali, E. Barreda, J. L. Golmard, J. Trouillet, P. Farahmand, P. Leprince, A. Pavié (France)*
Discussant: C. Knosalla (Berlin)

Continued on page 12

Cardiac: Abstract 08:15–09:45 **Room 112**

Mitral valve disease: surgery or intervention?

Lenard Conradi

Lenard Conradi *Department of Cardiovascular Surgery, University Heart Center Hamburg, Germany*

Surgical mitral valve repair (MVR) is currently the reference treatment for symptomatic severe mitral regurgitation (MR). Due to low perioperative morbidity and mortality, MVR may even be considered in asymptomatic patients. Implementation of minimally-invasive surgical techniques has decreased surgical trauma and further enhanced postoperative recovery. In patients with ventricular dysfunction and secondary functional MR however, the merits of corrective mitral valve surgery may be more ambiguous and a survival benefit has not been demonstrated to date. In addition, a substantial share of patients with severe MR is not being referred for surgery due to perceived high surgical risk. Frequently, these are elderly patients with relevant comorbidities, reduced left ventricular function and functional MR. It is for these patients that percutaneous treatment options may be an adequate alternative.

Surgical or percutaneous mitral valve repair for functional mitral regurgitation – comparison of patient characteristics and clinical outcomes

In the first of two studies we sought to retrospectively analyze our prospective hospital database of patients with severe functional MR undergoing either surgical MVR or percutaneous treatment using the MitraClip device. Patients undergoing MitraClip treatment were significantly older (p<0.001), had a lower left ventricular ejection fraction (p=0.014), and were generally more high-risk, with a significantly higher mean logEuroSCORE I compared to surgical candidates (p<0.001). 30-day mortality was 4.2% and 2.6% (p=0.557) and mean grade of residual MR was 1.4±0.8 and 0.2±0.4 (p<0.001) after MitraClip treatment and surgical MVR respectively. Unadjusted survival rate after six months was significantly lower in MitraClip patients. However, after multivariate regression analysis and adjustment for baseline differences, survival differences were no longer statistically significant (p=0.358) underscores the obvious impact of fundamentally different patient demographics on clinical outcome among the two cohorts.

Towards an integrated approach to mitral valve disease – implementation of an interventional mitral valve program and its impact on surgical activity

In this second study, we assessed the impact of providing an interventional mitral valve program using the MitraClip device on surgical mitral valve activity. In this analysis we aimed to answer the following questions:

1. What is the development of mitral valve surgical activity after introduction of an interventional mitral valve program?

From 2007 to 2010, 860 consecutive patients underwent mitral valve surgery for isolated or combined procedures at our center. A steady increase in the surgical caseload was observed over the years continuing despite implementation of an interventional mitral valve program in March, 2008 (figure 1a). This increase was significantly higher compared to the national background (figure 1b).

2. Is there a change in the spectrum of surgical patients regarding baseline demographics and risk factors?

Even though overall risk profile as estimated by logEuroSCORE I was similar before compared to after implementation of an interventional mitral valve program, there were several important differences between the two cohorts: the etiology of MR indicating surgery changed, especially the proportion of surgical candidates presenting with functional MR decreased significantly (p<0.001). Also, there were fewer patients with coronary artery disease and history of myocardial infarction (p<0.001). Finally, the share of patients undergoing re-do cardiac surgery decreased significantly (p<0.001).

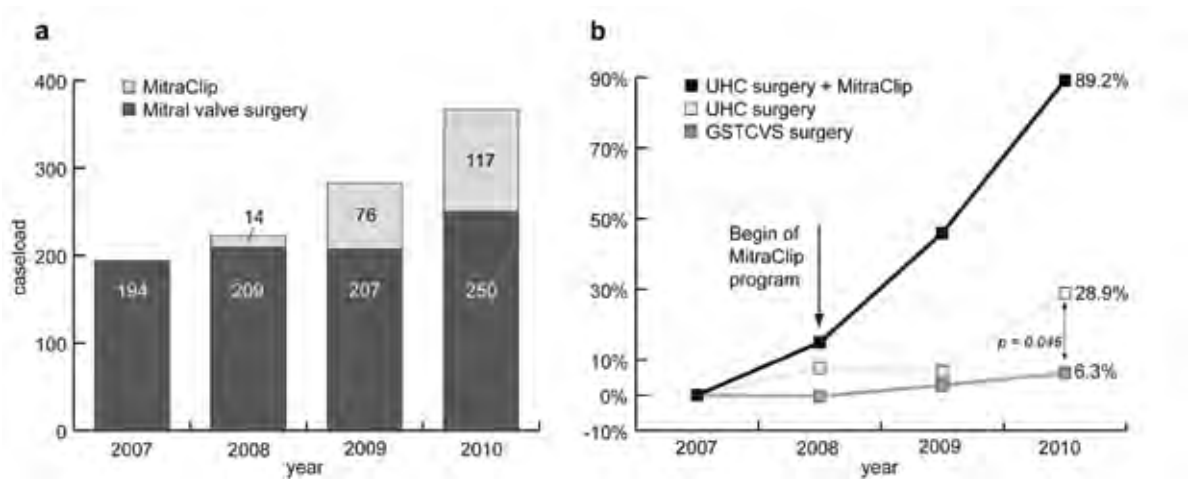
3. How are surgical and interventional mitral valve patients different?

Regarding almost all variables, interventional mitral valve patients were more high risk compared to surgical candidates, culminating in mean logEuroSCORE I of 30.4±19.0% and 9.6±10.7% respectively (p<0.001). Also, etiologies of MR indicating treatment were significantly different between the two cohorts. While interventional patients were treated predominantly for functional or mixed MR, surgery was performed for degenerative disease in approximately two thirds of cases (p<0.001).

4. What is the outcome of surgical mitral valve patients before compared to after introduction of an interventional mitral valve program?

Predicted perioperative mortality of surgical patients as stratified by logEuroSCORE I remained similar during the study period. Crude 30-day mortality however decreased markedly from 7.2% to 4.8%, even though this trend did not reach statistical significance in this single-center study with limited patient numbers. 30-day mortality for patients undergoing isolated MVR was 1.7% (5/303) in all patients during the study period.

At the University Heart Center Hamburg we strongly believe in an interdisciplinary approach to valvular heart disease. Decision-making should be a joint effort by a dedicated 'Heart Team' consisting of cardiologists and cardiac surgeons. Interdisciplinary assessment of patients, selection of the appropriate type of treatment, performing the procedure and post-procedural care should be a shared task. For us, this policy is key for clinical success and optimal patient outcomes.



Development of surgical and interventional mitral valve acitivity (a) and comparison to the nationwide development (b). UHC University Heart Center Hamburg, GSTCVS German Society for Thoracic and Cardiovascular Surgery.

estech

Estech Launches Next Generation Technology, the COBRA Fusion™ System for Surgical Cardiac Ablation

Revolutionary unique technology combines the benefits of a bipolar clamp with the flexibility and minimally invasive access of an endoscopically guided probe.

Estech, a leading provider of minimally invasive cardiac ablation devices, launches its COBRA Fusion™ Ablation System. This breakthrough technology is the first of its kind device utilizing a unique suction application and innovative electrode configuration to gently pull the tissue targeted for ablation into the device and out of the path of circulating blood. The COBRA Fusion overcomes the most significant challenge faced in minimally invasive epicardial ablation, the cooling effect of blood inside the heart, and reproducibly creates transmural lesions on a beating heart.

The COBRA Fusion incorporates proprietary Versapolar™ technology — an exclusive innovation that delivers both bipolar and monopolar radiofrequency (RF) energy. The new device is powered by Estech's patented temperature controlled radiofrequency (TCRF) energy which continuously monitors and maintains tissue temperature at target levels throughout the procedure. TCRF avoids the need for multiple applications that other technologies often require and ensures that tissue temperatures remain within a safe and effective range.

James L. Cox, M.D., the pioneer and creator of the Cox-Maze procedure stated: "I have had the recent opportunity to observe the clinical use of this new device in several patients. The historical problem of attaining atrial wall transmurality reliably in a beating, working heart by applying ablative energy from the epicardium only, appears to have been solved with this new device." Dr. Cox added: "The ability to involute the atrial wall into the ablation device itself using suction allows for the application of radiofrequency energy to both sides of the involuted tissue, thereby creating reproducible transmural and contiguous linear lesions for the first time off-pump. Moreover, the device is small enough to fit through a standard port, using an endoscopic port-access approach. I believe that this device represents a significant addition to the surgeon's armamentarium in the field of cardiac ablation."

The COBRA Fusion is the result of several years of research and development and has been extensively tested in several labs including the prestigious research lab at Washington University in St. Louis. Ralph J. Damiano, M.D. stated: "We have evaluated this new device in our animal lab and were very impressed with the results. It is an innovative device that has the potential to facilitate minimally invasive surgical ablation. It is likely to advance the field by improving lesion formation on the beating heart."

About Estech

Estech develops and markets a portfolio of innovative medical devices that enable cardiac surgeons to perform a variety of surgical procedures, while specializing in minimally invasive and hybrid ablation. The company's COBRA line comprises a number of first-ever technologies invented, developed, and brought exclusively to the cardiac ablation market by Estech. These include temperature-controlled RF energy delivery, Versapolar™ devices that provide both bipolar and monopolar energy, suction-applied tissue contact, and internally-cooled devices which provide superior ablation performance compared to other ablation systems. For more information, please visit www.estech.com

estech

DESIGNED TO PERFORM BUILT TO AMAZE

Estech COBRA Fusion™ Ablation System

When we set out to design the new COBRA Fusion, our goal was to create a new standard of performance for the treatment of Atrial Fibrillation. The result is a uniquely adaptable and effective platform that you have to experience to believe.

The first and only device with proprietary Versapolar™ technology, **COBRA Fusion can deliver both Bipolar and Monopolar energy.** Powered by patented TCRF (Temperature Controlled Radiofrequency), Fusion incorporates a unique suction design that eliminates the heat sink effect, enabling surgeons to create reproducible transmural lesions and return patients to normal sinus rhythm.

Designed to deliver better outcomes – that's the power of Fusion.

Visit us at Booth #107

www.estech.com

The Estech COBRA Fusion is intended to ablate cardiac tissue during cardiac surgery using radiofrequency (RF) energy when connected directly to the Estech Electrosurgical unit (ESU). The Estech COBRA Fusion may be used for temporary cardiac pacing, sensing, recording, and stimulation during the evaluation of cardiac arrhythmias during surgery when connected to a temporary external cardiac pacemaker or recording device. Estech does not promote off-label use of its products and their use is at the discretion of the cardiac surgeon. Estech is undertaking an IDE clinical trial and subsequent PMA submission to obtain a specific atrial fibrillation indication. In Europe, the Estech COBRA RF ablation products are CE marked with an indication for the treatment of atrial fibrillation by ablating cardiac tissue during surgery. Refer to the Instructions for Use (IFU) for detailed information on device description, instructions, contraindications, warnings and precautions.

Continued from page 10

10:30 **Does the use of old donor grafts have an effect on morbidity and mortality in heart transplantation? practical implications**
P. Farahmand, C. D'Alessandro, P. Demondion, S. Varnous, M. Laali, P. Leprince, A. Pavié (France)
Discussant: J. L. Pomar (Barcelona)

10:45 **Six-year outcomes following heart transplantation: effect of preservation solution on survival and rejection** *A. Cannata, L. Botta, T. Colombo, F. Macera, G. Masciocco, F. Turazza, M. Frigerio, L. Martinelli (Italy)*
Discussant: A. Simon (Harefield)

11:00 **Cardiac transplantation with non-heart-beating donors: haemodynamic and biochemical parameters at procurement predict recovery following cardioplegic storage in a rat model.**
M. Dornbierer, J. Sourdon, S. Huber, B. Gahl, T. Carrel, S. Longnus, H. Tevaearai (Switzerland)
Discussant: T. Wahlers (Cologne)

11:15 **High-risk donors in heart transplantation: are we pushing too far?** *A. Aliabadi, M. Groemmer, F. Eskandary, T. Haberl, O. Salameh, D. Wiedemann, G. Laufer, A. Zuckermann (Austria)*
Discussant: J. Dark (Newcastle upon Tyne)

11:30 **Primary graft dysfunction versus primary graft failure: are all graft problems created equal?**
A. Zuckermann, A. Aliabadi, D. Wiedemann, T. Haberl, O. Salameh, M. Groemmer, F. Eskandary, G. Laufer (Austria)
Discussant: A. Pavié (Paris)

11:45 **Session ends**

Focus Session

How to optimize transcatheter aortic valve implantation outcomes
Rooms 122/123
Moderators: A. Vahanian, Paris; V. Falk, Zürich

10:15 **Which valve for which annulus size**
N. M. D. A. van Mieghem (Rotterdam)

10:30 **Valve positioning and deployment (The Berlin addition)** *M. Pasic (Berlin)*

10:45 **Percutaneous valve leak assessment (with echocardiography new Valve Research Consortium definition)** *A. P. Kappetein (Rotterdam)*

11:00 **An alternative access approach**
P. Etienne (Brussels)

11:15 **Apical access and closure**
T. Walther (Bad Nauheim)

This session is supported with an unrestricted educational grant from Edwards Lifesciences

11:45 **Session ends**

The Presidential Address

Rooms 116/117

11:50 **The contraindications of today are the indications of tomorrow**
L. Von Segesser, Lausanne

12:30 **Lunch**

Abstracts

14:15 **Euroscore II: refining risk assessment**
Rooms 116/117
Moderators: P. Sergeant, Leuven; W. Gomes, São Paulo

14:15 **Development of EuroSCORE II** *S. Nashef (Cambridge)*
Discussant: D. Pagano (Birmingham)

14:30 **Comparison of the Euroscore II and Society of Thoracic Surgeons 2008 risk tools** *B. Kirmani, K. Mazhar, M. Pullan, B. Fabri (United Kingdom)*
Discussant: M. Mack (Dallas)

14:45 **Euroscore II does not improve prediction of mortality in high-risk patients: a study from two European centres**
N. Howell[1], S. Head[2], E. Senanayake[1], A. Menon[1], N. Freemantle[1], T. Van Der Meulen[2], A. P. Kappetein[2], D. Pagano[1] ([1]United Kingdom, [2]Netherlands)
Discussant: J. J. M. Takkenberg (Rotterdam)

15:00 **Comparison of original Euroscore, Euroscore II and STS risk models in an elderly cardiac surgical cohort** *A. Kunt[1], M. Kurtcephe[2], M. Hidiroglu[1], L. Cetin[1], A. Kucuker[1], V. Bakuy[1], A. R. Akar[1], E. Sener[1] ([1]Turkey, [2]United States)*
Discussant: P. Sergeant (Leuven)

15:15 **Is the new Euroscore II a better predictor for transapical aortic valve implantation?**
M. Haensig, D. Holzhey, M. Borger, S. Subramanian, G. Schuler, W. Shi, A. Rastan, F. Mohr (Germany)
Discussant: J. Obadia (Lyon-Bron)

15:30 **The future of risk scoring**
B. Bridgewater (Manchester)

Continued on page 14

Vascular: Professional Challenges 08:15–09:45 **Room 113**

State of the art in aortic arch surgery

Jean Bachet *Senior Consultant Surgeon, Zayed Military Hospital, Abu Dhabi, UAE.*

Jean Bachet

Surgery of the aortic arch has to deal with several important issues: The approach of the arch, the type of cardiopulmonary bypass, the protection of the cerebral structures and the replacement of the diseased aorta itself.

So, during several decades, it has been considered as a difficult challenge associated with important mortality and morbidity rates before it became much simpler, much safer and much more reliable through important progresses accomplished on each of those matters.

For example, cannulation of the femoral artery was systematic for all kind of aortic procedures. Yet, some years ago, it appeared that this issue could influence significantly the surgical results and that the choice of a proper arterial cannulation site was an integral part of the surgical strategy. This technique has, thus, lost its most prominent hegemony and many groups have turned to other modes of cannulation.

Conversely, cannulation of the right axillary artery, although less easy, proved to have numerous advantages. It allows full antegrade arterial inflow during the whole duration of CPB and selective antegrade perfusion of the brain during the arch repair and circulatory arrest. The Innominate artery cannulation has exactly the same advantages.

Cerebral protection appeared to be a key factor in the quality of the results obtained.

Described in 1975 by Griepp, the use of profound hypothermia associated with total circulatory arrest had become rapidly and universally accepted. But growing evidences of the limitations of this method also rapidly came out. This was also the case for the "retrograde perfusion" method. It seemed to be a good idea rapidly adopted but many experimental studies and clinical reports demonstrated that it was not very safe and reliable.

Because of those disappointing experiences, methods of Selective Antegrade Cerebral Perfusion (SACP) were described. Those techniques represented a real breakthrough and were rapidly supported by several undisputable experimental and clinical studies proving their superiority over the other known methods. In particular, in their many versions, they allowed to get rid of the drawbacks of profound hypothermia while keeping the advantages of circulatory arrest and providing an almost unlimited time to perform the aortic repair.

Similarly, the techniques for replacing the aortic arch itself became numerous.

Blood tight distal anastomoses, when performed directly, end-to-end, could be performed safely with the use of reinforcing adjuncts even though in chronic lesions, the aortic wall is generally solid enough to allow tight sutures without the aid of reinforcing artefacts.

The "Elephant trunk" technique described by Borst in 1983 represented another great step forward allowing easy and safe distal anastomosis and making second stage operations on the descending aorta easier. It was followed some years ago by the technique of "Frozen elephant trunk" which seems extremely promising, in particular in patients with acute or chronic dissections.

Last, but not least, reimplantation of the three vessels may be performed in many ways, either "en bloc" or "separately" using industrially prepared prostheses available on the market or with "home made" grafts such as in the "trifurcated arch graft" technique. Complex modes of reimplantation of the supra aortic vessels like the "arch-first" technique have been successfully described. All have advantages and drawbacks. As well as depending on the location, type and cause of the aneurysm, they depend on the personal preferences and habits of the surgical team, the local surgical culture and the experience developed.

All those more or less "conventional" techniques are presently challenged by new "hybrid" approaches. Those combine the implantation of extra-anatomic bypasses to the supra-aortic vessels with endovascular stent-grafting of the aortic arch. They might make easier some procedures and allow broadening their indications. Yet, those techniques of "debranching" are still questioned. As stated by Karck in a recent review: « this novel modality might reduce operative mortality and morbidity including major stroke. At present, the summarized mortality is not less than calculated after the conventional or frozen elephant trunk technique. So far this technique might become a meaningful alternative after further technical evolution. At present the indication of this method should be strongly limited to otherwise inoperable patients. » We strongly agree and we remain convinced that the "conventional" techniques of replacing the arch still represent the "gold standard."

Ease of use and procedure success redefined

Jörg Kempfert
Kerckhoff Clinic, Bad Nauheim, Germany

It has been one year since Symetis S.A. debuted its newly-approved ACURATE TA Aortic Bioprosthesis and Delivery System. The product was launched commercially in Lisbon during the EACTS 2011 Annual Meeting and since then over 200 implantations of the marketed device have been performed in Europe and South America. ACURATE TA is designed specifically for transapical access and is available in three sizes to treat annulus diameters of 21mm to 27mm. The bioprosthesis is composed of a self-expanding nitinol stent housing a regular porcine tissue valve. A full profile of the design and function of the ACURATE TA will be presented at EACTS 2012 during the Symetis lunch symposium held on Monday, October 29 at 12:45 in rooms 129/130.

Today, the ACURATE TA has established itself as an alternative to first generation TAVR systems with its comparable safety and efficacy profile as shown in two clinical trials. At 12 months follow-up, pooled data from the pre-approval studies (n=90) show a survival rate of 80.0% with negligible paravalvular leak rates (leak above +1 in only two patients).

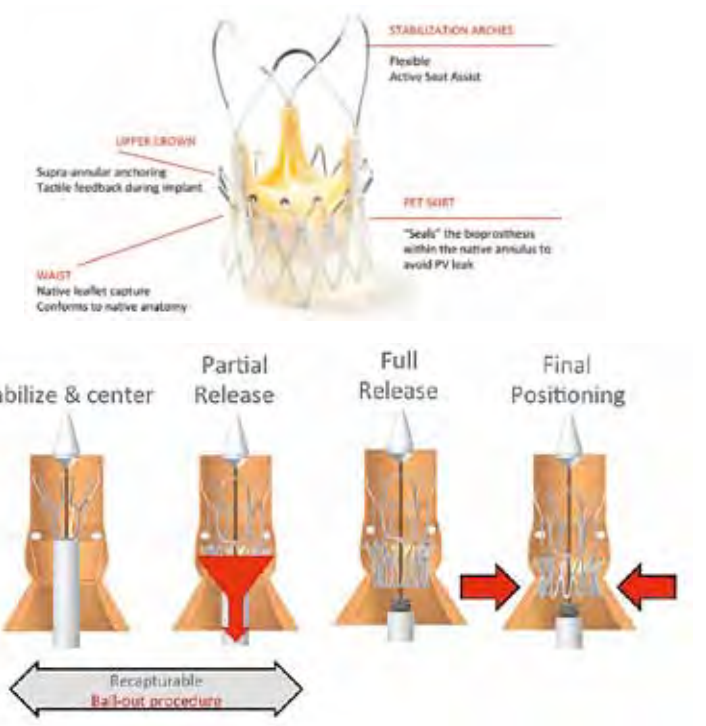
An important characteristic of the ACURATE TA that sets it apart from the competition is its ease of use. For second generation TAVR systems to be successful they must be easier to use than the first devices on the market. The ACURATE TA is a very simple-to-use device: a true single-operator system with a small, simple valve loader and a facile two-step implantation procedure that includes not only visual markers but tactile feedback guaranteeing correct placement in the native annulus. Its self-seating and conformable architecture allows for perfect positioning within the anatomy once the product is deployed. This ease of use, coupled with a short operator learning curve, translates into good results and safe outcomes for patients.

Place loader (above) and delivery (below)

The two-step implantation sequence begins after the delivery system has crossed the native valve and anatomical and commissural alignment is achieved using the radio-opaque markers and stent posts.

Step one starts by turning the release knob until the stabilization arches and upper crown are opened. The operator may pull gently toward the LV for tactile feedback that correct position is achieved and the native annulus is "capped". At this point the device can be resheathed if repositioning is required.

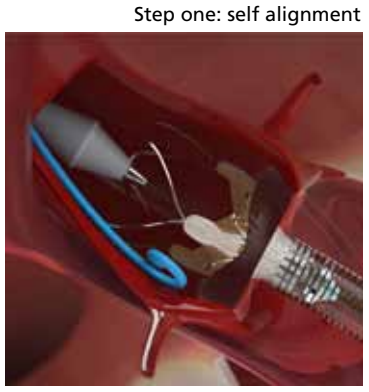
Step two commences with removal of the safety button (which inhibits premature deployment) and the operator continues to turn the release knob until the lower crown is opened and the bioprosthesis is fully deployed. Retrieval of the delivery system can then be performed.



Brief procedure times, on average four minutes from transapical introduction of the delivery system to retrieval after implant, also distinguishes the ACURATE TA from the competition. Procedure success rates of 94.4% in pre-market clinical trials and 98.7% in commercial implants, attest to the device's ease of use.

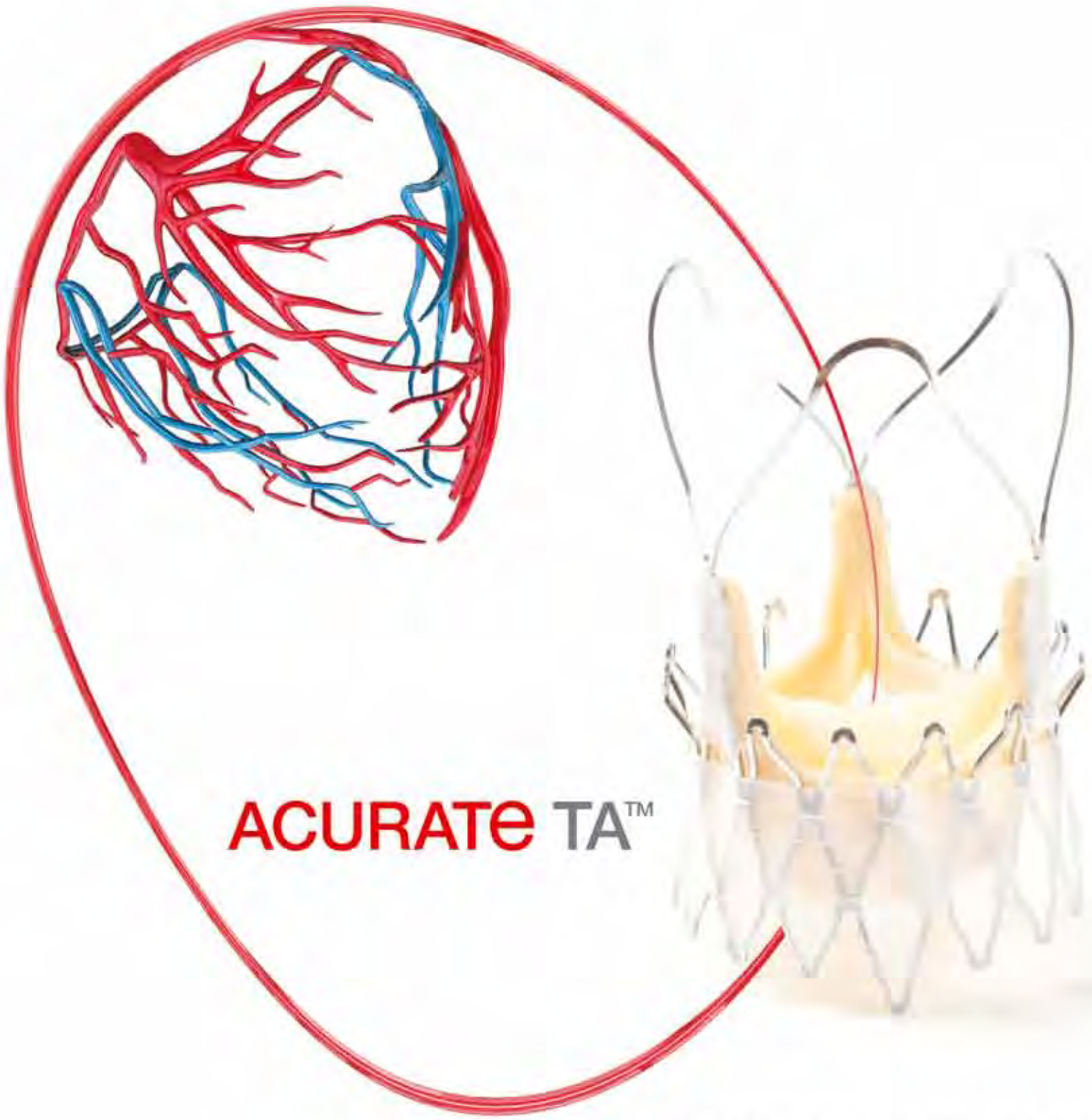
With its successful first year on the market and a growing demand for the device by the cardiovascular surgical community, its no surprise the ACURATE TA has become an attractive, alternative option for treating high-risk patients with severe aortic stenosis.

Step one: self alignment



Step two: controlled deployment

Ease of use to match your expertise



The ACURATE TA™ puts you firmly in control.

Its distinctive design and unique technology compliment your skills to facilitate successful implantation. You can confidently guide the valve into place and feel when the correct positioning has been achieved.

The ACURATE TA™ gives you the precision and control needed for consistently successful TAVI and improved patient outcomes.

symetis
intuitive at heart

The Next Generation Transapical TAVI System.

Simplicity Engineered, Confidence Delivered.

CE
0050

SYMETIS SA | chemin de la venoge 11 ch-1024 ecublens switzerland | t +41 21 651 0160 | f +41 21 651 0161 | info@symetis.com | www.symetis.com

MCC 810 008 REV.B

Continued from page 12

15:45 **Session ends**

Abstracts

14:15 **Refining techniques in minimally invasive mitral valve surgery**

Room 115

Moderators: T. Folliguet, Paris; M. Glauber, Massa

14:15 **Minimally invasive mitral valve surgery: influence of aortic clamping technique on early outcomes**
A. Mazine, D. Bouchard, H. Jeanmart, J. Lebon, M. Pellerin (Canada)
Discussant: M. Kolowca (Rzeszow)

14:30 **Mitral valve pathology in severely impaired left ventricles can be successfully managed using a right-sided minimally invasive surgical approach**
J. Garbade, J. Seeburger, M. Barten, S. Lehmann, B. Pfannmüller, M. Misfeld, M. Borger, F. Mohr (Germany)
Discussant: E. Ferrari (Lausanne)

14:45 **Non-inferiority of minimally invasive mitral repair versus median sternotomy for Barlow's disease: three-year clinical results**
G. Nasso, V. Romano, K. Fattouch, R. Bonifazi, G. Visicchio, N. Di Bari, G. Balducci, G. Speziale (Italy)
Discussant: R. Stuklis (Adelaide)

15:00 **Use of automatic knot-tying and cutting device is shortening aortic cross-clamp times in minimally invasive mitral valve surgery**
B. Gersak, B. Robic (Slovenia)
Discussant: F Van Praet (Aalst)

15:15 **Minimally invasive mitral valve reconstruction on the fibrillating heart is an attractive surgical strategy for high-risk patients** *J. Kilo, E. Ruttmann, H. Hangler, M. Grimm, L. Müller (Austria)*
Discussant: F. Siclari (Lugano)

15:30 **Antegrade and retrograde arterial perfusion strategies in minimally invasive mitral valve surgery: a propensity score analysis on 1280 patients** *M. Murzi, A. G. Cerillo, A. Miceli, E. Kallushi, G. Bianchi, S. Bevilacqua, M. Solinas, M. Glauber (Italy)*
Discussant: G. Wimmer-Greinecker (Bad Bevensen)

15:45 **Session ends**

Focus Session

14:15 **The front door approach: the role of the surgeon in selecting the best patient-specific access route**

Room 112

Moderators: F. Mohr, Leipzig; L. Van Garsse, Maastricht

14:15 **Introduction and objectives** *F. Mohr (Leipzig)*

14:20 **The transapical approach: a safe technique** *M. Pasic (Berlin)*

14:30 **New transapical devices in perspective** *H. Treede (Hamburg)*

14:40 **Will the transapical approach become a percutaneous procedure? Outlook on new transapical companion devices** *J. Kempfert (Leipzig)*

14:50 **A cardiologist performing transapical and transfemoral transcatheter aortic valve implantation** *H. Möllmann (Bad Nauheim)*

15:00 **Dispelling myths around results of the transapical approach: beyond the learning curve in the PARTNER trial** *A. P. Kappetein (Rotterdam)*

15:10 **Alternative surgical access: transaortic and subclavian** *V. Bapat (London)*

15:20 **Transapical transcatheter aortic valve implantation in perspective** *T. Walther (Bad Nauheim)*

This session is supported with unrestricted educational grants from Edwards Lifesciences, JenaValve Technology GmbH, Medtronic International Trading Sàrl and Symetis S.A.

15:45 **Session ends**

Abstracts

16:15 **Late-breaking trials I**

Rooms 116/117

Moderators: O. Alfieri, Milan; G. Laufer, Vienna

16:15 **The Engager transapical aortic valve implantation system: first results from the multicentre European Pivotal Trial**
H. Treede[1], S. Baldus[1], A. Linke[1], D. Holzhey[1], S. Bleiziffer[1], J. Börgermann[1], J.-L. Vanoverschelde[2], V. Falk[3] ([1]Germany, [2]Belgium, [3]Switzerland)
Discussant: N. Moat (London)

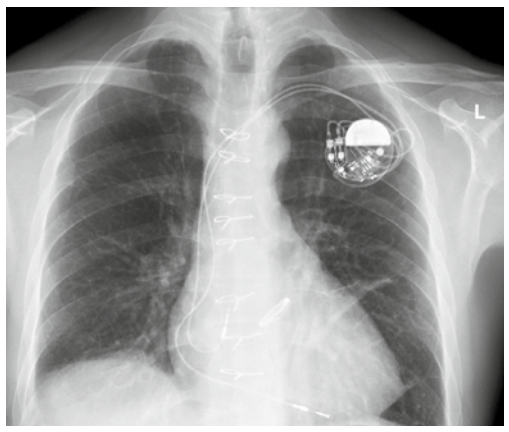
16:30 **Coronary artery bypass grafting versus percutaneous coronary intervention in a "real-world" setting: insights from the Cooperation**

Continued on page 18

Cardiac: Abstracts 08:15–09:45 Room 114

Pacemaker dependency after isolated aortic valve replacement – do conductance disorders recover over time?

Ingo Kutschka *Department of Cardio-Thoracic, Transplantation and Vascular Surgery, Hannover Medical School, Hannover, Germany*



Caption

Ingo Kutschka

The incidence of early postoperative permanent pacemaker (PPM) implantation after isolated aortic valve replacement (AVR) is 3-8.5%. So far, there is little evidence about long-term PPM dependency of patients that required PPM implantation following cardiac surgery.

In this study we focused on patients who received isolated aortic valve replacement and early postoperative PPM implantation due to conduction disturbances in our institution. We aimed to determine the long-term outcome and PPM dependency of these patients.

Furthermore, we aimed to identify predictors for long-term pacemaker dependency in order to avoid unnecessary PPM implantations and to decide for early PPM implantation in selected patients. Liberal PPM implantation may be inefficient and poses patients to an avoidable risk of complications. On the other hand, a delayed implantation increases morbidity by immobilization and the risk for sudden death caused by unpredictable conduction disorders without sufficient ventricular escape rhythm. To our knowledge the current study is the first one that analysed long-term PPM dependency after isolated AVR.

Since January 1997 a total of 2106 consecutive patients underwent isolated AVR at our institution. Out of these, 138 patients (6.6%, 72 female, mean age 71 ± 12 years) developed significant conduction disorders leading to PPM implantation within the first 30 days postoperatively. Preoperative ECG showed normal sinus rhythm (n = 64), AV block I° (n = 19), left bundle branch block (LBBB, n = 13), right bundle branch block (RBBB, n = 16), left anterior hemiblock (LAHB, n = 14) and AV block with ventricular escape rhythm (n = 10). Atrial fibrillation was present in 23 patients. Pacemakers were implanted after 7 ± 6 days following AVR. PPM dependency was analyzed by ECG and pacemaker check during follow-up.

A total of 45 out of 138 AVR patients with postoperative PPM implantation died during a mean follow-up time of 5.3 ± 4.7 years. Further nine patients were lost to follow-up. Long-term survival at 1-, 5-, and 10 years was 88%, 79% and 59%, respectively. Only eight (10%) out of 84 survivors were not pacemaker dependent anymore. The majority of patients (n = 66, 87%) required permanent ventricular stimulation, the remaining 10 patients (13%) showed intermittent stimulation with a mean ventricular stimulation fraction of 73 ± 30%. The univariate analyses did not identify any association of pre- or perioperative parameters with long-term PPM dependency.

Since AV conduction disorders after AVR did not recover in the majority of our patients, we recommend early implantation of permanent pacemakers in these patients. The main benefits of early PPM implantation include timely mobilization and recovery, shorter ICU stay as well as earlier discharge from hospital. The risk of sudden death due to asystole, AV block or drug induced arrhythmias could be significantly reduced in the early postoperative period. Furthermore, early PPM implantation is economically reasonable, considering the low PPM associated complication rates, faster recovery rates, shorter hospital stay and falling prices of pacemaker devices.

Thoracic: Abstracts 08:15–09:45 Room 133/134

Diagnosis of a suspicious lung mass before operating: Is it worth waiting for ?

Alan Sihoe *Queen Mary Hospital, Hong Kong SAR, China.*

Primum non nocere.
First do no harm.

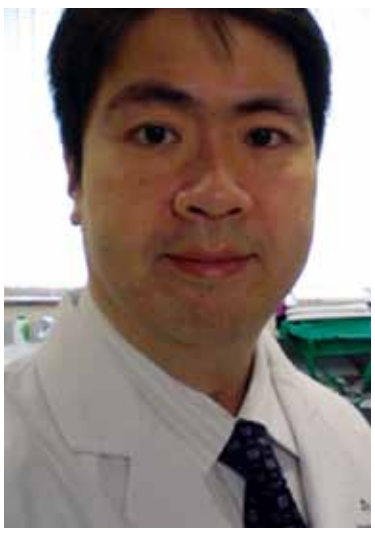
Surgery is inherently traumatic to the patient and has the potential to cause harm. As students and trainees, we have all been taught that there must be a strong indication for operating before submitting the patient to major surgery.

When operating on a solitary pulmonary mass suspicious of lung cancer, the traditional surgical approach would have been via an open thoracotomy. This of course is now recognized as a particularly painful approach which has the capacity to cause considerable morbidity. Therefore, established wisdom dictates that every effort should be made to confirm a diagnosis of malignancy before taking the patient to the operating room.

However, the world is changing.

Today, the incidence of patients being found to have a suspicious lung mass is rapidly increasing. This has been brought about by a combination of many factors, including: increasing public awareness of health issues; unprecedented access to screening services; and modern advances in radiological imaging (including increasing use of Positron Emission Tomography). The potential benefit in terms of detecting earlier staged disease is, however, counter-balanced by an increased burden on diagnostic services to investigate these lesions – such as bronchoscopy or imaging-guided percutaneous biopsy. There is emerging evidence suggesting that presentation-to-diagnosis and presentation-to-treatment intervals may already be increasing in recent years. Moreover, even if pre-operative diagnostic investigations are performed, they may not yield a positive diagnosis in a significant proportion of patients. For these patients, the wait for the diagnostic test would have been in vain, and surgical biopsy will still be required.

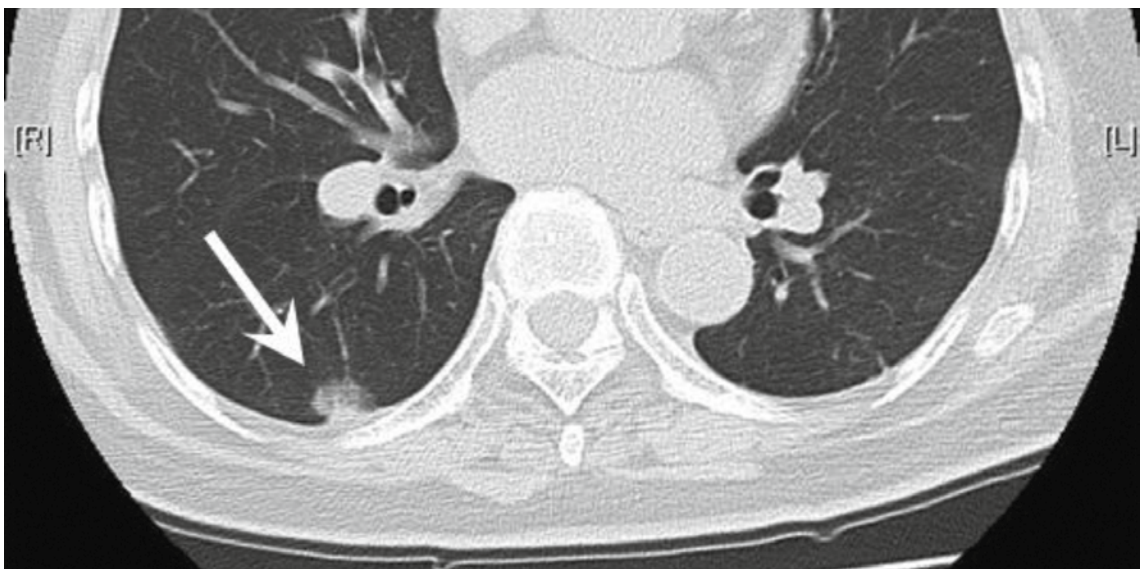
On the other hand, Video Assisted Thoracic Surgery (VATS) has already been established as a safe, low-morbidity approach for the diagnosis of many thoracic conditions, including solitary lung nodules. If the trauma of thoracotomy is negated by VATS, can the thresholds for bringing the patient to the operating room be safely lowered? The modern surgeon has the option of performing a VATS biopsy of the suspicious lung mass, sending the tissue for frozen section analysis, and then proceeding to surgery if lung cancer is confirmed. By foregoing pre-operative diagnostic services altogether in this way, will this help minimize presentation-to-treatment intervals and benefit the patient?



Alan Sihoe

The counter-argument is that proceeding straight to surgery as a routine strategy may involve operating on a large number of patients with benign disease that would not have required surgery at all. Regardless of how minimally invasive that surgery is, is it safe or ethical to be subjecting patients to a policy of wanton surgery? In this era of increasing incidence of suspicious lung lesions being found, the thoracic surgeon must confront this important clinical conundrum: is it still worth waiting for a diagnosis before offering surgery?

In the Thoracic Oncology I session (8:15 AM-9:45 AM on Monday, October 29), Dr Alan Sihoe will be presenting a study from Hong Kong looking at the pros and cons of operating for a suspicious lung mass without a pre-operatively confirmed tissue diagnosis. Delegates will be welcome to share experiences and opinions on this issue of rapidly growing clinical relevance.



An increasingly common scenario:
incidental finding of a small pulmonary nodule or ground-glass opacity suspicious of malignancy

TAKE CONTROL

TAKE JENAVALVE.

Anatomically correct positioning

The JenaValve and its unique ***positioning feelers***

Think control - Take control - Therapy control

JENAVALVE

Designed with the patient at heart

JenaValve Technology GmbH | Guerickestraße 25, 80805 Munich - Germany
T +49 89 55 27 908-0 | F +49 89 55 27 908-79 | **www.jenavalve.de**

Vascular: Professional Challenges 08:15–09:45 **Room 113**

Open aortic arch replacement in the era of endovascular techniques

Paul P. Urbanski *Cardiovascular Clinic, Bad Neustadt, Germany*

Although the results of open aortic arch surgery have improved dramatically in the last decade, this procedure is still considered high-risk. Unfortunately, the results from the 90s or even the 80s are frequently used to support the argumentation that the use of extracorporeal circulation and deep hypothermic circulatory arrest, which are needed for open arch surgery, lead to increased mortality and morbidity. Hence, thoracic endovascular aortic repair (TEVAR) of aortic arch pathologies, which is combined as a hybrid procedure with bypassing or re-routing (also called debranching) of supra-aortic arteries, has been proposed recently.

Avoiding open surgery in patients with aortic arch pathology is seldom possible because it is mostly combined with pathology of the ascending aorta and it is therefore not surprising that in the last report from the Transcontinental Registry about total arch re-routing, almost 60% of patients required the use of CPB. Even an aortic arch aneurysm that seems to be isolated is frequently combined with atherosclerosis and calcifications that are spread out in the entire proximal aorta (Figure 1). Given that the proximal aorta is a main source of cerebrovascular embolism, not only a tangential clamping of the ascending aorta should

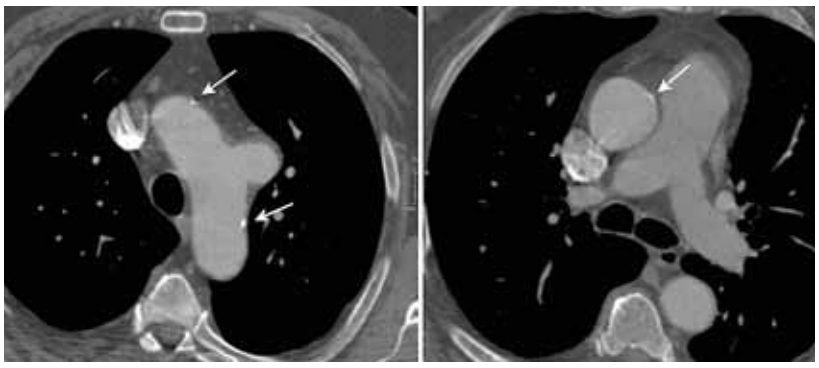


Figure 1

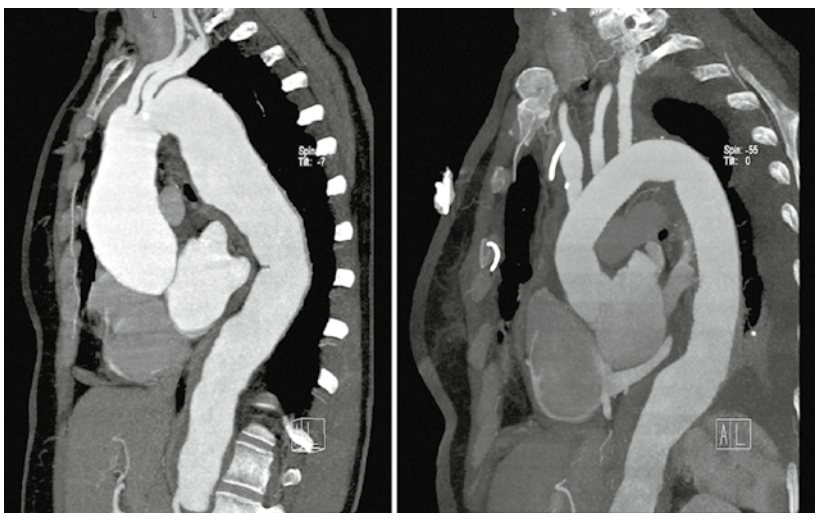


Figure 2

be avoided in such cases but its complete replacement is even indicated. The refined technique of conventional aortic arch repair, although more invasive in some cases, provides definitive repair with excellent clinical results and offers the possibility to repair concomitant cardiac pathologies simultaneously (Figure 2). Aortic arch pathology is very frequently associated with an aortic valve defect, and, because it is mostly pure insufficiency, a valve-sparing surgery can be performed. In our series, 87% of the patients needed aortic valve and/or root surgery concomitantly to arch repair, and the valve could be preserved in more than half of them. Even if there is no doubt that deep hypothermia as well as CA, CPB, and surgery times are the clear predictors of an increased risk in cardiovascular surgery, the avoidance of deep hypothermia and considerable shortening of all these aspects mentioned above could be achieved by the recent improvements of surgical and perfusion strategies. Our study demonstrates that conventional arch surgery offers definitive repair and, if performed using current perfusion and operative techniques, leads to excellent results with very to low mortality and morbidity. Open surgery ensures simultaneous aortic valve repair, which is frequently necessary, and can be performed by reconstruction in more than half of the cases. Use of refined surgical techniques with cerebral perfusion allows avoidance

Paul Urbanski

of deep hypothermia with all its negative side effects and leads to excellent outcomes against which the results of alternative approaches should be compared.

Cardiac: Abstracts 08:15–09:45 **Room 112**

Is commissural closure for the treatment of mitral regurgitation durable?

A long-term (up to 15 years) clinical and echocardiographic study

Michele De Bonis
Cardiac Surgery Department, San Raffaele Scientific Institute, Milan, Italy

Degenerative mitral regurgitation (MR) due to commissural chordal rupture or elongation has been corrected with several different surgical methods including neochordae implantation, chordal transposition, extended leaflet sliding technique, papillary muscle repositioning, replacement of the commissural area by a partial mitral homograft or by the posterior leaflet of the tricuspid valve. The absence of a unique and standardized approach in this context demonstrates the challenging feature of commissural MR. The edge-to-edge approximation of the anterior and posterior mitral leaflets at the commissure (commissural closure) has been used in this context as a "functional" rather than "anatomical" repair. Unlike the surgical procedures mentioned above, which can be demanding for a number of reasons, suture closure of the commissure followed by annuloplasty eliminates commissural mitral insufficiency simply and rapidly. A single, standardized and easily reproducible approach which can be employed to treat anterior, posterior and bileaflet prolapse at this level. In this study we assessed the long term (up to 15 years) clinical and echocardiographic results of this method in 125 patients with degenerative or post-endocarditis prolapse or flail of the anterior-lateral (23.2%) or posterior-medial (76.8%) commissure. Hospital mortality was 1.6%. At hospital discharge, MR was absent or mild in 120 (97.5%) patients and moderate (2+/4+) in 3 (2.4%). Clinical and echocardiographic follow-up was 98.4% complete (mean length 7.1±3.0 years, median 6.7 years, longest follow-up 15 years). At 11 years freedom from reoperation was 97.4±1.4% and freedom from MR≥3+ 96.3±1.7%. At the last echocardiographic exam, MR≥3+ was demonstrated in only four patients (4/121, 3.3%). Mean mitral valve area and gradient were respectively 2.9±0.4cm2 and 3.4±1.1mmHg. NYHA functional class I or II was documented in all cases. Suturing both leaflets together seems to challenge fundamental surgical concepts in mitral repair and raises a number of questions about the risk of inducing mitral stenosis, the degree of impairment of mitral leaflet motion and the overall long-term durability. However, according to our long-term results, the supposed drawbacks and risks of this technique are more theoretical than practical. Similarly to what has been reported by other groups, we did not experience any significant restriction, suture dehiscence or recurrent prolapse at the site of repair. The absence of mitral stenosis was confirmed by the low transvalvular pressure gradients recorded immediately after surgery and at the last echocardiographic follow-up. Long-term durability of the repair and clinical conditions of the patients were both excellent up to 15 years after the operation. Because of its simplicity and durability commissural closure remains the method of choice to correct isolated commissural mitral valve regurgitation in our Institution. This reliable and easily reproducible technique might hopefully increase the number of reconstructive procedures performed in this setting.

JOTEC®

SOLUTIONS FOR VASCULAR DISEASE

The Future of Aortic Surgery

Lunch Symposium

Monday, 29th October 2012,
12:45 – 2:00 p.m. Room 120/121

Chair: R. Autschbach, C. Mestres

- **The E-vita open hybrid prosthesis for the treatment of the acute complicated type B dissection,** *M. Grabenwöger*
- **The frozen elephant trunk technique: Bologna experience and the international registry,** *R. Di Bartolomeo*
- **Surgical strategies for type A dissection - the Essen approach,** *H. Jakob*
- **Combined procedure using the hybrid E-vita open plus and E-vita thoracic endoprosthesis in thoracic aortic diseases. The French experience,** *J.P. Verhoye*

To learn more, please visit our booth No. 121

www.jotec.com

Continued from page 14

Study *F. Nicolini, D. Fortuna, P. Guastaroba, D. Pacini, S. Di Bartolomeo, R. De Palma, R. Grilli, T. Gherli (Italy)*
Discussant: T. Graham (Birmingham)

16:45 **Myocardial revascularization in the era of drug-eluting stent/off-pump coronary surgery: from the CREDO-Kyoto percutaneous coronary intervention/coronary artery bypass graft Registry Cohort-2** *A. Marui, T. Kimura, T. Komiya, T. Kita, R. Sakata (Japan)*
Discussant: D. Pagano (Birmingham)

17:00 **Off-pump transapical implantation of artificial chordae to correct mitral regurgitation (TACT trial): proof of concept**
J. Seeburger[1], M. Rinaldi[2], R. Lange[1], M. Schoenburg[1], S. Nielsen[3], O. Alfieri[2], F. W. Mohr[1], K. Aiditeis[4] ([1]Germany, [2]Italy, [3]Denmark, [4]Lithuania)
Discussant: G. Lutter (Kiel)

17:15 **First-in-man evaluation of the new Apica ASC™ transapical access and closure device**
J. Blumenstein[1], J Kempfert[1], A Van Linden[1], WK Kim[1], H Moellmann[1], V Thourani[2], T Walther[1] ([1]Germany, [2]United States)
Discussant: V. Subramanian (New York)

17:45 **Session ends**

Focus Session

16:15 **Multiple valves**
Room 115
Moderators: M. J. Antunes, Coimbra; A. Colli, Padua

16:15 **Aortic stenosis and mitral regurgitation** *R. Rosenhek (Vienna)*

16:30 **Tricuspid regurgitation and mitral regurgitation** *J. Kluin (Utrecht)*

16:45 **Carcinoid syndrome** *S. Rooney (Birmingham)*

17:00 **Outcomes in multiple valves** *J. J. M. Takkenberg (Rotterdam)*

17:15 **Double valve replacement: biological versus mechanical prostheses** *E. Elmistekawy, V. Chan, B. Lam, T. Mesana, M. Ruel (Canada)*
Discussant: L. De Kerchove (Brussels)

17:30 **Associations between valve repair and reduced operative mortality in mitral/tricuspid double valve surgery**
J. S. Rankin, V. Thourani, R. Suri, X. He, S. O'Brien, C. Vassileva, M. Williams (United States)
Discussant: T. Doenst (Jena)

17:45 **Session ends**

Focus Session

16:15 **Minimally invasive aortic valve repair**
Room 114
Moderators: A. Haverich, Hannover; A. Repossini, Brescia

16:15 **The evidence base for minimally invasive aortic valve repair** *M. Borger (Leipzig)*

16:30 **Sutureless valves** *M. Shrestha (Hanover)*
Discussant: L. Von Segesser (Lausanne)

16:45 **Different approaches** *M. Glauber (Massa)*
Discussant: M Palmen (Leiden)

17:00 **Aortic valve replacement with the Perceval S sutureless prosthesis: clinical outcomes in 140 patients** *K. Zannis, T. Folliguet, G. Ghorayeb, M. Noghin, D. Czitrom, L. Mitchell-Heggs, F. Laborde (France)*
Discussant: J. O. Solem (Lund)

17:15 **Aortic valve replacement in geriatric patients with small aortic roots: are sutureless valves the future?** *M. Shrestha, K. Hoeffler, I. Maeding, H Laue. B. Borchert, C Barra S. Sarikouch, A. Haverich (Germany)*
Discussant: U. Lockowandt (Stockholm)

17:30 **Developing a practice** *C. Young (London)*
Discussant: N. Howell (Birmingham)

This session is supported with an unrestricted educational grant from the Sorin Group

17:45 **Session ends**

Focus Session

16:15 **Is there a limit in the repair of mitral & tricuspid regurgitation?**
Room 112
Moderators: M.Castella Barcelona; J L Pomar, Barcelona

16:15 **Functional regurgitation in mitral and tricuspid valve disease** *M Sitges (Barcelona)*

16:30 **What are the differences in the left ventricle and right ventricle hemodynamic? Similarities and differences** *B Bijnens (Barcelona)*

16:45 **Surgical techniques and long term results in**

Continued on page 20

Cardiac: Abstracts 08:15–09:45 **Room 116/117**

A real-world comparison of second-generation drug-eluting stents versus off-pump coronary artery bypass grafting in three-vessel and/or left main coronary artery disease


Gijong Yi

Gijong Yi *Gangnam Severance Hospital, Seoul, Korea*

Coronary artery bypass grafting (CABG) has been known as the gold standard for the treatment of triple-vessel or left main coronary artery disease. Recently updated guidelines from European Society of Cardiology and European Association for Cardio-Thoracic Surgery and the American College of Cardiology Foundation and American Heart Association confirmed CABG as Class I indicated therapy for triple-vessel and left main disease. But in real practice, percutaneous coronary intervention (PCI) has increased in patients with triple vessel and/or left main disease especially after the introduction of drug-eluting stent (DES). Recently, the second generation DES has been introduced and widely used due to its better stent design and greater biocompatibility. Coronary artery bypass grafting (CABG) has shown superior clinical outcomes compad with PCI throughout bare-metal stent and 1st generation DES era, but there is lack of data comparing CABG and the 2nd generation DES. Authors aimed to assess the clinical outcomes between off-pump coronary artery bypass grafting (OPCAB) and PCI with 2nd generation DES in triple vessel and/or left main patients.

In our current study, 1821 consecutive patients who underwent OPCAB or PCI with 2nd generation DES as their initial revascularization therapy were included. We compared clinical outcomes focusing on major adverse cardiac and cerebrovascular event (MACCE) in a real world and in a propensity score-based matched population (N-=902). Follow-up duration was 23.0±13.0 months (0-56).

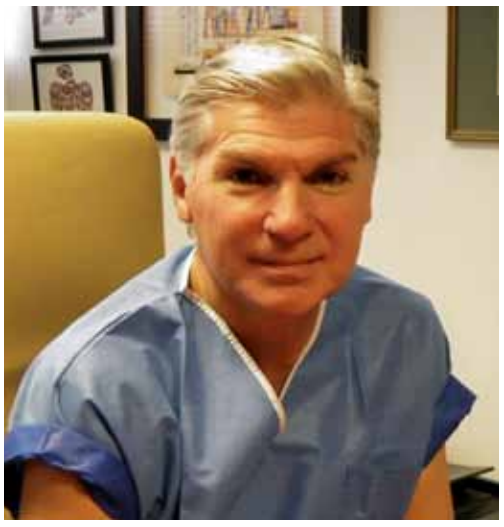
In a real world comparison, the overall MAACE rate was 7.3% in the PCI group and 3.8% in the OPCAB group (p=0.001). The 3-year freedom from MACCE rate was 88.4±1.5% in the PCI group and 94.9±1.0% in the OPCAB group (p=0.002). In matched population comparison, the 3-year freedom from MACCE rate was 86.4%±2.3% in the PCI group and 94.6±1.6% in the OPCAB group (p=0.001). The freedom rates from nonfatal myocardial infarction and target vessel revascularization at 3 years were 95.8±1.6% and 92.4±2.0 in the PCI group and 98.7±0.8 in the OPCAB group (p=0.020, p=0.002, respectively). The determining factors were nonfatal myocardial infarction and target vessel revascularization. In both triple vessel and left main subset analysis, the OPCAB group showed superior freedom from MACCE rate (p=0.008, p=0.001, respectively).

In our current analysis, the OPCAB group consistently showed superior mid-term clinical outcomes in triple vessel and/or left main disease in the second generation DES era both in a real world and in a matched population. Nonfatal myocardial infarction and target vessel revascularization were the determining factors. Surgical bypass should be the first treatment option in patients with triple and/or left main patients in the second generation DES era. Longer follow-up with randomization will clarify our current results.

Cardiac: Abstracts 08:15–09:45 **Room 118/119**

The transaortic approach for TAVI

A valid alternative to the transapical access for patients with hostile vascular anatomy


Mauro Romano

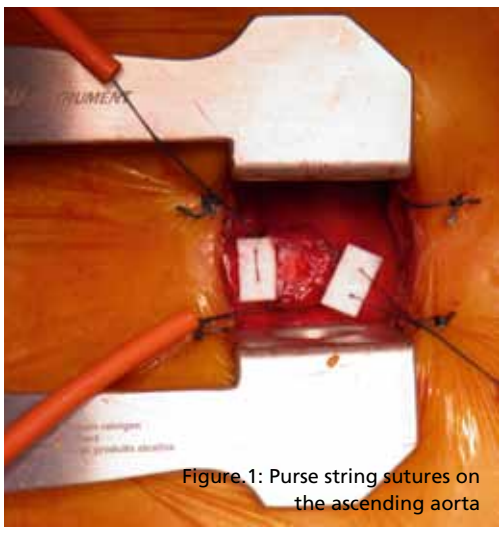


Figure.1: Purse string sutures on the ascending aorta

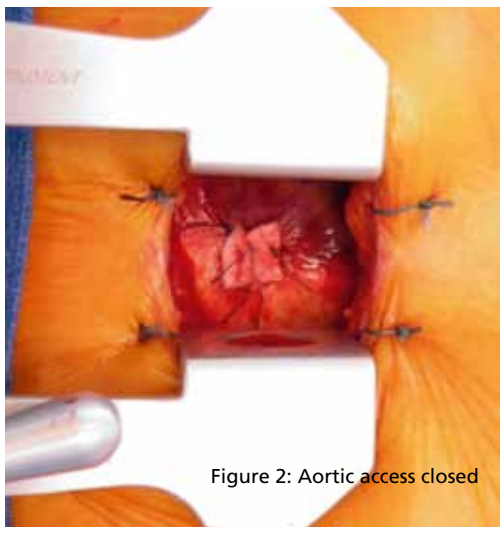


Figure 2: Aortic access closed

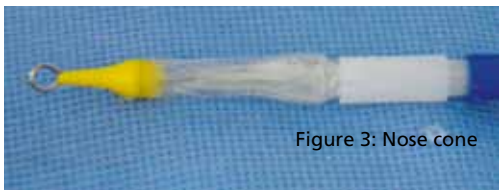


Figure 3: Nose cone

Mauro Romano *Italy*

The recently introduced transaortic approach seems to be the appropriate answer to the problem of the access route in patients with poor peripheral vessels and/or hostile chest.

This technique of transcatheter aortic valve implantation was systematically adopted at our Institution since January 2011. To the best of our knowledge, with 94 patients, we present at this meeting the largest single center experience in the world.

The choice of the transaortic approach lies mainly in the surgeon's familiarity with upper manubriotomy and canulation of the ascending aorta wich are daily practice in cardiac surgery (Figures 1 and 2) without the need of new specific training,the absence of apical complications such as bleeding,pseudoanurysm or delayed rupture,the absence of myocardial damage resulting in decreased ejection fraction,the avoidance of intercostal pain and pleural complications wich are important limitations of the transapical approach and a better subjective tolerance.

Besides this,the short distance between the sheath and aortic annulus allow increased coaxiality and stability leading to easy positioning and deployment of the device potentially reducing X-ray exposure and contrast medium administration.

On the other hand,the absence of "navigation"of guidewires and catheters in the aortic arch could decrease the risk of distal embolization in patients with aortic debris in the horizontal or descending aorta.Indeed the incidence of cerebrovascular,procedure related, accidents (3.2%)was lower than that observed in PARTNER B (6.7%) and A (5.5%).

In patients with complex coronary artery disease such distal left main,bifurcation lesions or multivessel disease not suitable for PCI,off pump coronary artey bypass can be performed in the same session with full sternotomy immediately before the transcatheter aortic valve implantation.

Moreover the transaortic approach is potentially more effective than the transapical access route in managing complications by allowing quick and easy conversion to open chest surgery.

In our experience the only limitation was the occasional difficulty in crossing the native aortic valve with the Ascendra delivery system currently available when we started our experience prompting us to adopt a "sheath-dilator " manoeuver no more necessary now with the new Ascendra + device equipped with a nose cone (Figures 3 and 4).

Our results show a device success rate of 92.6% and 30-day mortality and combined safety point in 7.4% and 14.9% of patients respectively according to the VARC criteria;this compares favorably with the transapical approach or conventional aortic valve replacement in high risk populations.

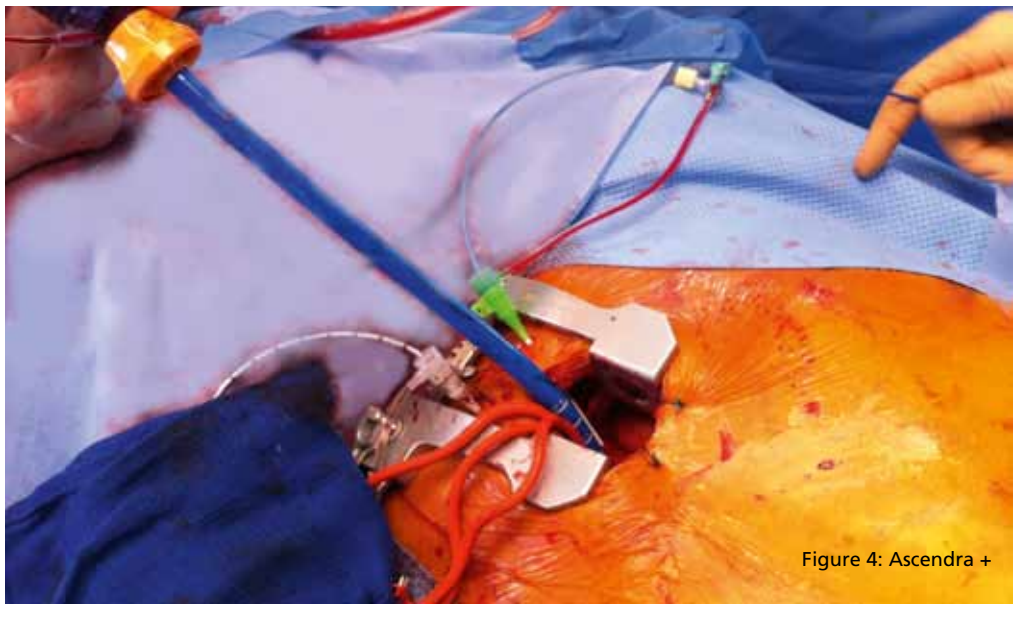


Figure 4: Ascendra +

VASCUTEK SYMPOSIUM

Monday 29 October 2012

12.45 – 14.00hrs, Rooms 133/134

Innovative Product Designs & Emerging Implantation Techniques

Chairman:

Professor Axel Haverich, Germany

12.50 - 12.55 Introduction by Professor Axel Haverich

12.55 - 13.15 Dr Davide Pacini, Italy

> Stentless BioValsalva™ Composite Graft: The Bologna Experience

13.15 - 13.35 Professor Christian Hagl, Germany

> First Experience with Stented BioValsalva™

13.35 - 13.55 Dr Malakh Shrestha, Germany

*> Total Aortic Arch Replacement with Thoraflex™ Hybrid**

14.00 Close

* CE Approval Pending

This is not part of the official EACTS Scientific Programme

VASCUTEK, a **TERUMO** Company
Newmains Avenue, Inchinnan
Renfrewshire PA4 9RR, Scotland, UK
Tel: +44 141 812 5555 Fax: +44 141 7170
www.vascutek.com

Continued from page 18

	mitral regurgitation: Where do we stand?	*R. De Paulis (Rome)*
17:00	**Operative Techniques and outcomes in functional tricuspid regurgitation**	*G. Dreyfus (Monte Carlo)*
17:15	**What are the factors in the development of recurrent tricuspid regurgitation?**	*F. Casselman (Aalst)*
17:30	**Discussion**	

This session is supported by an unrestricted educational grant from Edwards Lifesciences

Focus Session

16:15	**Heart rejuvenation**	
Room 111		
	Moderators: W. Brawn, Birmingham; J. R. Pepper, London; D. J. Chambers, London; M. Kanani, London	
16:15	**Cardioplegia**	*D. Chambers (London)*
16:35	**Stem cells**	*P. Menasche (Paris)*
16:55	**Ex vivo heart and lung preservation**	*A. Simon (Harefield)*
17:15	**Preconditioning and its future**	*V. Venugopal (London)*
17:45	**Session ends**	

Thoracic Disease

Abstracts

08:15	**Thoracic oncology I**	
Rooms 133/134		
	Moderators: M. E. Dusmet, London; P. Van Schil, Antwerp	
08:15	**The role of preoperative computed tomography-guided hook-wire localization in thoracoscopic resection for ground- glass opacity pulmonary lesions: a prospective analysis**	*T. Ye, J. Zhou, H. Hu, G. Li, W. Li, L. Shen, H. Chen (China)*
	Discussant: M. Jimenez (Salamanca)	
08:30	**Surgical results of non-small-cell lung cancer with the appearance of ground-glass opacity**	*S. Cho, S. Jheon (Republic of Korea)*
	Discussant: P. Van Schil (Antwerp)	
08:45	**Innate immune function following major lung resection for bronchogenic carcinoma via video-assisted thoracoscopic surgery and thoracotomy**	*R. Jones, N. Anderson, J. Murchison, M. Britton, W. Walker, A. J. Simpson (United Kingdom)*
	Discussant: S. Margaritora (Rome)	
09:00	**Operating on a suspicious lung mass without a preoperative tissue diagnosis: pros and cons**	*A. Sihoe, R. Hiranandani, H. Wong, E. Yeung (Hong Kong)*
	Discussant: R. Rami-Porta (Barcelona)	
09:15	**Is lobectomy really more effective than sublobar resection in surgical treatment of second primary lung cancer?**	*A. Zuin, L. Andriolo, G. Marulli, M. Schiavon, S. Nicotra, F. Calabrese, P. Romanello, F. Rea (Italy)*
	Discussant: P. De Leyn (Leuven)	
09:30	**Which is the most important prognostic factor in neuroendocrine tumours of the lung? A single-centre experience**	*A. Sandri, F. Guerrera, G. Bora, A. Oliaro, L. Delsedime, P. Lausi, S. Olivetti, P. L. Filosso (Italy)*
	Discussant: P. B. Licht (Odense C)	
09:45	**Coffee**	
10:15	**Thoracic oncology II**	
	Moderators: P. G. Dartevelle, Le Plessis Robinson; P. De Leyn, Leuven	
10:15	**Prognostic stratification of stage IIIa pn2 non-small-cell lung cancer by hierarchical clustering analysis of tissue microarray immunostaining data: an Alpe Adria Thoracic Oncology Multidisciplinary Group study (ATOM 014)**	*G. Aresu, G. Masullo, E. Baracchini, A. Follador, F. Grossi, A. Morelli (Italy)*
	Discussant: P. G. Dartevelle (Le Plessis Robinson)	
10:30	**Enzyme-linked immunosorbent spot for monitoring of postoperative immununosupression of patients with lung cancer**	*P. Rybojad, A. Jabłonka, B. Wilczyñska, J. Tabarkiewicz (Poland)*
	Discussant: M. Lucchi (Pisa)	
10:45	**Surgical management of malignant tumours invading the inferior vena cava**	*D. Fabre, P. Bucur, R. Houballah, E. Fadel, S. Mussot, O. Mercier, P. Dartevelle (France)*
	Discussant: L. Spaggiari (Milan)	

Continued on page 22

Cardiac: Abstracts 08:15–09:45 **Room 114**

Transcutaneous lead implantation

Connected to an externalized pacemaker in patients with implantable cardiac defibrillator/pacemaker infection and pacemaker dependency

Simon Pecha[1], Muhammed Ali Aydin[2], Yalin Yildirim[1], Björn Sill[1], Beate Reiter[1], Iris Wilke[2], Hermann Reichenspurner[1], Hendrik Treede[1] 1 Department of Cardiovascular Surgery, University Heart Center Hamburg, Germany: 2 Department of Cardiology, Electrophysiology, University Heart Center Hamburg, Germany

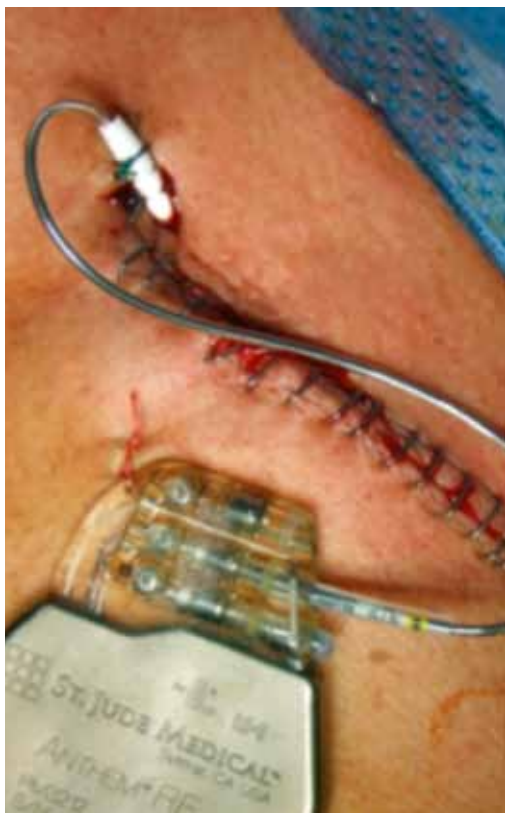


Figure 1: Externalized lead and pacemaker device for temporary pacing

Simon Pecha

A new therapy option in patients with pacemaker infection- and pacemaker dependency is removal of the infected device and implantation of a new temporary active fixation RV lead on the ipsilateral side which is then connected extracorporally to the old pacemaker device programmed for bipolar stimulation.

We used this approach in 12 patients with pacemaker/ICD infection and pacemaker dependency. Laser lead extraction was performed and simultaneous implantation of a new RV lead with active fixation, connected extracorporally to the old pacemaker/ICD device, was conducted. Antibiotic therapy was initiated. After normalization of infection parameters and wound conditions a new pacemaker/ICD system was implanted on the contralateral side and temporary RV lead was removed.

Mean patient´s age was 71.3 +/-9 years. Laboratory infection parameters were elevated in all patients (Mean CRP 79 mg/dl, mean Leukocytes counts 12.4). After Laser lead extraction, temporary pacing was necessary in all patients due to severe bradycardia (<30 bpm). Temporary pacing was achieved by ipsilateral implantation of a new active fixation lead. Mean time of antibiotic treatment was 14.3 +/- 3 days and mean duration of temporary pacing 11.2 days. When laboratory infection parameters were in normal range and blood culture samples showed negative results, a new system was implanted successfully on contralateral side in all patients. No major procedure related peri- or postoperative adverse events occurred. Mean time of hospitalization was 19 days. Follow-up after twelve month showed freedom from reinfection of 100%.

Implantation of a temporary active fixation RV lead connected to an externalized pacemaker and pursued antibiotic therapy seems to be a good option for patients with device infection and pacemaker dependency. The technique helps to avoid unsecure temporary pacing by floating balloon catheters.

Cardiac: Abstracts 08:15–09:45 **Room 114**

Better monitoring – better outcome?

Concomitant surgical atrial fibrillation ablation and Eventrecorder implantation

Simon Pecha[1], Timm Schäfer[1], Friederike Hartel[2], Teymour Ahmadzade[1], Irina Subbotina[1], Hermann Reichenspurner[1], Florian Wagner[1] *1Department of Cardiovascular Surgery, University Heart Center Hamburg, Germany; 2 Department of Cardiology, Electrophysiology, University Heart Center Hamburg, Germany*

Concomitant ablation is an established therapy in cardiac surgical patients with atrial fibrillation (AF). Post-discharge care seems to be an essential factor for clinical outcome. We analyzed the influence of Eventrecorder (ER) implantation and consecutive post-operative follow-up by our department of electrophysiology.

Between 07/2003 and 08/2010 401 cardiac surgical patients underwent concomitant surgical AF ablation therapy. Since 08/2009 an Eventrecorder (REVEAL XT, Medtronic Inc., Minneapolis, Minnesota) was implanted in 98 patients intraoperatively. ER interrogation was performed by our department of electrophysiology three, six and 12 months postoperative. Result and outcome was compared to a matched cohort of patients with ablation and no ER monitoring. Primary endpoint of the study was sinus rhythm rate after 12 months.

Mean patient's age was 67.0 ± 9.7 years, 68.4% were male. No major ablation related complications occurred. Overall sinus rhythm conversion rate was 65.3% after one year follow-up. Sinus rhythm rate off antiarrhythmic drugs was 60.3% respectively. Conversion rate tended to be higher in patients with an implanted ER (69.3% vs. 60.1%, respectively; p= 0,098). Sinus rhythm rate off antiarrhythmic drugs was also higher in ER group (64.3% vs. 56.2). Patients with ER were seen more often by a cardiologist in the first year postoperative (3.1 +/-0.8 vs. 1.5 +/- 0.9 p<0.05) and received significantly more additional procedures like electrical cardioversion or additional catheter based ablation (16.1% vs. 4.3%; p< 0.001; 11.2% vs. 3.1%; p<0.001).

Implantation of an Event-Recorder with link-up to a cardiology and/or electrophysiology provides optimized antiarrhythmic drug management and higher rates of consecutive procedures like cardioversion or additional catheter-based ablation. As a result a trend to higher sinus rhythm conversion rate was observed after one year.

Cardiac: Focus Session 14:15–15:45 **Room 112**

Transapical TAVI in perspective

Thomas Walther *Klinik für Herzchirurgie, Bad Nauheim, Germany*

Transcatheter aortic valve implantation (TAVI) has evolved as a routine procedure to treat elderly high-risk patients suffering from severe symptomatic aortic valve stenosis. T-AVI is being performed using different access options, either by implanted using a retrograde endovascular approach (transfemoral TF, transsubclavian TS, transaortic TAo) or an antegrade transapical approach (TA).

Many physicians consider the TF approach being less invasive than the TA approach, leading to patient selection and higher TF versus TA implantation rates in many countries. In addition, sicker patients with peripheral vascular disease are then being treated using the TA approach. Differences in outcomes are then compared. Such comparisons are not valid.

From a scientific standpoint there is no evidence that the TF approach leads to better results than the TF approach and there is no prospective randomized trial examining this aspect (at present). Therefore current assumptions, which are being taken from selected series or from registry data, are not valid. In similar patients the TA approach clearly is as good or even better than the TF approach. There are many quite obvious advantages of TA-AVI: Access to the aortic valve is relatively short and straight, thus allowing for easy and precise manipulations. The prosthetic valve is being inserted antegradely, the system can be placed quite coaxially by means of a guidewire and very controlled implantation can be performed. Obvious data from the medical literature (Source registry, Prevail TA study) indicate the lowest access related complication rate, which is below 1%, for the TA approach. This is clearly lower than with any other of the available access modalities. In addition there is clear evidence from a metaanalysis on more than 10,000 patients indicating that the TA approach is associated with the lowest stroke rate.

The TA approach, off course, requires an anterolateral minithoracotomy at present. This access, however, is very safe and patients usually tolerate it quite easily. At present several access and closure systems (APICA; PERMASEAL; ENTOURAGE, CARDIOAPEX) are entering clinical trials which may lead to an even more standardized and safe apical access and closure in due course. Other options, such as relatively simple access to the mitral valve, will be feasible with the TA approach as well. In the future a percutaneous apical access and closure may get into reach with these new access and closure systems, thus allowing for a completely percutaneous approach, guided by advanced imaging modalities.

Several technical options will become available with current and future generations of transapical transcatheter valve systems. Some of them are solutions to prevent paravalvular leakage such as with the SAPIEN 3 (Edwards) valve or some assistance during positioning together with partial retrievability such as with the Engager, Jenavalve, Symetis devices. Future iterations of these systems will help physicians to obtain improved outcomes for their patients. Cardiac surgeons should be encouraged to be actively involved in the field of T-AVI as an active partner in the heart team. The transapical approach, due to its excellent features and outcomes, should be used frequently to safely treat elderly high risk patients.

Cardiac: Abstracts 16:15–17:45 **Room 116/117**

Myocardial revascularization in the era of drug-eluting stent/off-pump coronary surgery: From the CREDO-Kyoto PCI/CABG Registry Cohort-2

Akaira Marui *Kyoto University, Japan*

Several studies comparing percutaneous coronary interventions (PCIs) with coronary artery bypass grafting (CABG) demonstrated similar long-term survival outcomes for PCI and CABG. However, the current increase of PCI with drug-eluting stent (DES) or off-pump CABG (OPCAB) may change the power relationship in the area of myocardial revascularization. Particularly in Japan, OPCAB is employed more frequently (>60%) than it is in the US or Europe, which may enable a more reliable comparison between PCI with DES and OPCAB. In addition, risk stratification such as by SYNTAX score may also enable more accurate comparison.

The CREDO Kyoto Cohort-1 and -2 are large multi-center registries in Japan enrolling over 25,000 patients undergoing first PCI or CABG. In the CREDO-Kyoto Registry Cohort-1, we have reported the outcomes comparing PCI with CABG in the era of bare-metal stent. Now in the present study, we identified 3986 patients with triple-vessel and/or left main disease of 15,939 patients with first myocardial revascularization enrolled in the CREDO-Kyoto Registry Cohort-2. There were 2,190 patients received PCI mainly with DES, 655 on-pump CABG (ONCAB), and 1141 OPCAB. We used propensity-score analysis to adjust the differences in baseline characteristics of patients undergoing PCI or CABG.

As a result, cumulative 4-year incidence of death was higher after PCI than CABG (15.7% vs. 12.4%, p<0.01). Adjusted mortality after PCI was also higher than CABG. (hazard ratio [95% confidence interval]: 1.36 [1.02-1.81], p=0.03), whereas adjusted mortality was similar between ONCAB and OPCAB (1.00 [0.65-1.52], p=0.98). Stratified analysis using the SYNTAX score demonstrated that risk for death was not different between PCI and OPCAB in patients with low (<23) and intermediate (23 to 33) SYNTAX score (1.00 [0.52-1.91], p=0.36 and 1.05 [0.59-1.85], p=0.88), whereas those with high (≥33) SYNTAX score, they were significantly higher after PCI than that after OPCAB (2.51 [1.33-4.74], p<0.01). On the other hand, adjusted mortality was not different between ONCAB and OPCAB regardless of the SYNTAX score. These results indicate that in patients with triple-vessel and/or left main disease, both OPCAB and ONCAB are associated with better long-term survival than PCI using DES in patients with higher SYNTAX score. Survival outcomes are similar between ONCAB and OPCAB regardless of the complexity of coronary lesions.

In conclusion, CABG should be selected in those patients with more complex coronary lesions due to better survival than PCI. Selection of ONCAB or OPCAB should be properly determined according as patients' comorbidities because of similar survival outcome.

Akaira Marui

Continued from page 20

11:00 **Pneumonectomy with en bloc chest wall resection: is it worthwhile? Report on 34 patients from two institutions** G. Cardillo, L. Spaggiari, D. Galetta, F. Carleo, L. Carbone, G. Ngome Enang, M. Martelli (Italy)
Discussant: P. Van Schil (Antwerp)

11:15 **Sleeve resections of the bronchus without pulmonary resection for endobronchial carcinoid tumours** *K. Nowak[1], W. Karenovics[2], A. Nicholson[2], S. Jordan[2], M. Dusmet[2] ([1]Germany, [2]United Kingdom)*
Discussant: P. De Leyn (Leuven)

11:30 **Robot-assisted versus thoracotomy lymphadenectomy for early stage non-small-cell lung cancer: preliminary results** *F. Allidi, F. Melfi, O. Fanucchi, A. Picchi, F. Davini, A. Mussi (Italy)*
Discussant: R. Schmid (Bern)

11:50 **Presidential address**

12:30 **Lunch**

Abstracts

14:15 **Thoracic oncology III**
Rooms 113/114
Moderators: L. Spaggiari, Milan; P. B. Licht, Odense

14:15 **Dynamic 4-dimensional computed tomography for preoperative assessment of lung cancer invasion into adjacent structures** *C. K. C. Choong, S. Pasricha, S. Stuckey, J. Smith, J. Troupis (Australia)*
Discussant: A. Zuin (Padua)

14:30 **Outcome after full-thickness chest wall resection for isolated breast cancer recurrence** *E. Fadel, D. Levy Faber, F. Kolb, S. Delaloge, P. Dartevelle (France)*
Discussant: G. Cardillo (Rome)

14:45 **Occult pleural dissemination of cancer cells detected using the touch print cytology method during surgery shows survival impact** *D. Kim, Y. Kim, Y. Park (Republic of Korea)*
Discussant: M. Dusmet (London)

15:00 **Preoperative serum ICTP levels as a predictor of recurrence in patients with non-small-cell lung cancer** *Y. Tanaka, S. Oura, T. Yoshimasu, F. Ota, K. Naito, Y. Hirai, M. Ikeda, Y. Okamura (Japan)*
Discussant: L. Spaggiari (Milan)

15:15 **Do the histological subtypes of non-small-cell lung cancer correlate with the clotting disorders present in patients submitted to radical surgical resection?** *N. Theakos, G. Athanassiadis, S. Pispirigou, L. Zoganas, P. Behrakis (Greece)*
Discussant: P. B. Licht (Odense)

15:30 **Prediction of in-hospital mortality following pulmonary resections: improving on the Thoracoscore risk model** *M. Poullis, R. Page, M. Shackcloth, N. Mediratta (United Kingdom)*
Discussant: D. Wood (Seattle)

Abstracts

16:15 **Thoracic non-oncology I**
Rooms 133/134
Moderators: J. Wihlm, Strasbourg; A. D. L. Sihoe, Hong Kong

16:15 **Normalized cardiopulmonary function following the Nuss procedure for pectus excavatum: 3-year follow-up. A prospective, controlled study** *M. Maagaard, M. Tang, H. H. Nielsen, J. Frøkiær, S. Ringgaard, M. Lesbo, H. Pilegaard, V. Hjortdal (Denmark)*
Discussant: J. Wihlm (Strasbourg)

16:30 **Omitting chest tube drainage after thoracoscopic major lung resection** *K. Ueda, M. Hayashi, K. Hamano (Japan)*
Discussant: P. Sardari Nia (Breda)

16:45 **Early and late outcome after surgical treatment of benign tracheo-oesophageal fistulas** *G. Marulli, M. Loizzi, G. Cardillo, L. Battistella, A. De Palma, G. Ngome Enang, D. Zampieri, F. Rea (Italy)*
Discussant: A. Lerut (Leuven)

17:00 **Pain control of thoracoscopic major pulmonary resection: is pre-emptive local bupivacaine injection able to replace intravenous patient-controlled analgesia?** *H. C. Yang, J. Lee, I. Song, J. Lee, W. Choi, S. Cho, K. Kim, S. Jheon (Republic of Korea)*
Discussant: N. Novoa (Salamanca)

17:15 **Long-term results of pectoralis muscle flap**

Continued on page 24

Cardiac: Abstracts 08:15–09:45 **Room 115**

‘One step’ subendocardial implant of autologous stem cells during modified left ventricular restoration for ischemic heart failure

G.Stefanelli, F. Benassi, D.Gabbieri, G.Danniballe, D.Sarandria, C.Labia, and G.Gioia *Hesperia Hospital, Modena ITALY, AtlantiCare, Heart Institute, NJ, USA°*

Benassi

The authors report in this paper a single institution, single surgeon, 10 years experience, with patients affected by ischemic dilatation of left ventricle and mean ejection fraction < 30%, and submitted to surgical ventricular restoration (SVR) since 2002. The operative technique has changed with time, moving from the concept of ‘volume reduction surgery ‘ to the idea of reshaping the ventricular chamber to a more elliptical geometry. Therefore the last 28 patients, out of 59 treated by SVR (group B) underwent a modified surgical technique different from the classical DOR operation adopted in the first cases (group A) (Figure 1). An aggressive approach to the mitral valve, often incompetent in these cases, has been associated in 61% of patients, and consisted of annular undersizing and, in selected cases, of papillary muscles approximation.

As adjunct to the surgical treatment, since 2007, a randomized clinical trial was initiated, with the aim of verify the impact on left ventricular function of direct subendocardial implant of autologous bone marrow derived mononuclear cells (BMMNCs) into the scarred myocardium, as a concomitant procedure during SVR. 80 to 100cc. of bone marrow were harvested from the sternum before skin incision, treated in a sterile mini-lab aside the operating room to obtain 5–8cc. of concentrated BMMNCs, and injected by direct puncture in the infarcted areas before closure of ventriculotomy.

The results of our experience seem encouraging. The total early mortality for the entire group was 3.4% (0% for group B). During a mean follow-up time of 7.4 years (10 years–8 months)

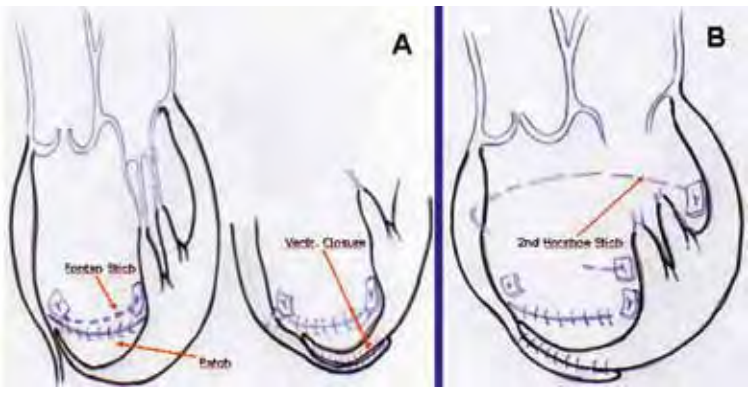


Figure 1: Operative details: Technique A (DOR) versus technique B (modified CABROL)

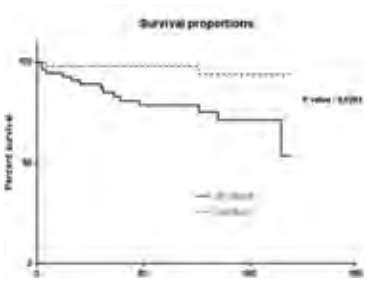


Figure 2: Survival function for the entire group (death for all causes and cardiac)

17 patients died (28.8%). If we exclude the non cardiac deaths, mortality rate for heart failure was 3.5%, (Figure 2), with a freedom from hospitalization of 78%. A multivaried analysis has failed to identify risk factors for early nor late mortality While no statistical difference exist for mortality and clinical outcome between the two groups of patients, impact of surgical technique on left ventricular end diastolic diameter and HYHA class is remarkable (Figure 3), in favor of the modified one, even more in the group of patient implanted with BMMNCs. Six patients treated with cell therapy have demonstrated at pet-scan control a partial recruitment of infarcted areas (p<0,05) (Figure 4).

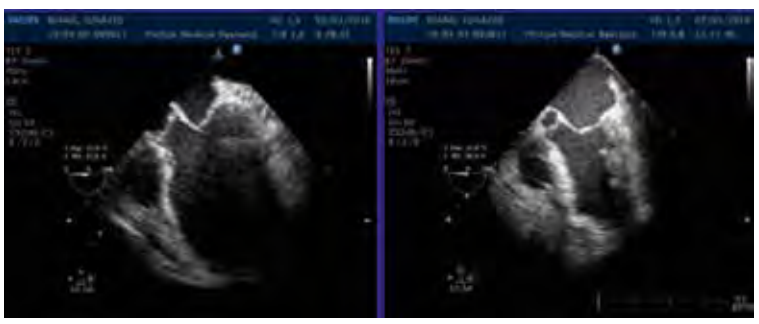


Figure 3: SVR: TE echo at surgery. Pre-op (left) and post-op

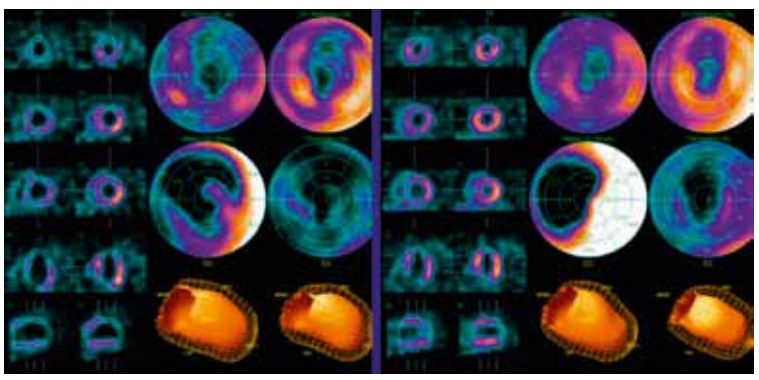


Figure 4: PET-scan preoperative and at six-months after implant of BMMCS and SVR. Pre (left) and post (>six months)

SVR is an promising and evolving technical solution for heart failure patients. It has to be considered as a part of a more complex and articulate approach. Cardiac regenerative medicine represent an innovative, adjunctive tool for the treatment of this severe disease.

Cardiac: Abstracts 08:15–09:45 **Room 112**

Management of moderate secondary mitral regurgitation at the time of aortic valve surgery

Gonçalo F. Coutinho
University Hospital of Coimbra, Portugal

Secondary mitral regurgitation (MR) of varying degrees has been reported in up to two thirds of patients undergoing AVR (aortic valve replacement), this often raises the question of whether additional mitral valve surgery is necessary[1,2]. While severe secondary MR obviously requires intervention, non-severe MR is often left unaddressed at the time of AVR, because it is expected to decrease after surgery.

Relatively few studies to date have examined the clinical impact of secondary MR in patients undergoing AVR[3,5] and the majority of prior reports have involved small sample sizes and are confounded by the inclusion of patients with organic or ischemic mitral valve disease. Furthermore, an even smaller number have evaluated the persistence of MR in the long-term and its impact on survival.

The aim of our present study was to examine: 1- the prevalence of secondary MR in our population; 2- the surgical options (to intervene or not on the mitral valve) and their impact

Continued on page 23

Table 1 – Preoperative Characteristics

Baseline characteristics	Group A	Group B	P- Value
Age (years)	64.4±10.5	68.6±12.1	0.006
Male Sex	71(75.5%)	90 (55.9%)	0.002
Body surface area (m²)	1.72±0.16	1.67±0.21	0.081
NYHA III-IV	67 (71.3%)	98 (60.9%)	0.093
Chronic atrial fibrillation/flutter	30 (31.9%)	31 (19.3%)	0.022
Hypertension	40 (42.6%)	103 (64.0%)	0.001
Diabetes mellitus	13 (13.8%)	21 (13.0%)	0.859
COPD	13 (13.8%)	20 (12.4%)	0.747
Coronary disease	78 (83.0%)	48 (29.8%)	0.023
Previous myocardial infarction	4 (4.3%)	12 (7.5%)	0.310
Previous stroke/TIA	3 (3.2%)	10 (6.2%)	0.290
Carotid artery disease	5 (5.3%)	21 (13.0%)	0.049
Renal Failure	11 (11.7%)	11 (6.8%)	0.181
Aortic stenosis	48 (51.1%)	131 (81.4%)	0.001
Echocardiographic findings			
Mitral Regurgitation (grade)	3.3±0.5	2.8±0.3	0.001
LA diameter (mm)	49.4±7.7	46.7±7.5	0.008
LV end-diastolic dimension (mm)	66.9±9.5	58.9±8.6	0.001
LV end-systolic dimension (mm)	47.9±9.7	40.1±9.6	0.001
IVS (mm)	11.5±2.2	12.4±2.9	0.041
LVPWT (mm)	10.1±1.9	10.8±2.4	0.066
Ejection Fraction (%)	47.6±16.7	56.2±18.4	0.004
Shortening Fraction (%)	28.3±8.0	32.1±9.6	0.002
LV dysfunction (EF<45%)	42 (44.7%)	36 (22.4%)	0.001
Peak aortic gradient (mmHg)	70.2±30.0	82.1±32.7	0.015
Mean aortic gradient (mmHg)	50.5±21.1	54.7±24.1	0.259
Pulmonary hypertension	26 (27.7%)	27 (16.8%)	0.039

NYHA – New York Heart Association; COPD – chronic obstructive pulmonary disease; TIA – Transient ischemic attack; LA – Left atrium; LV – left ventricle; IVS. – interventricular septum; LVPWT – left ventricular posterior wall thickness

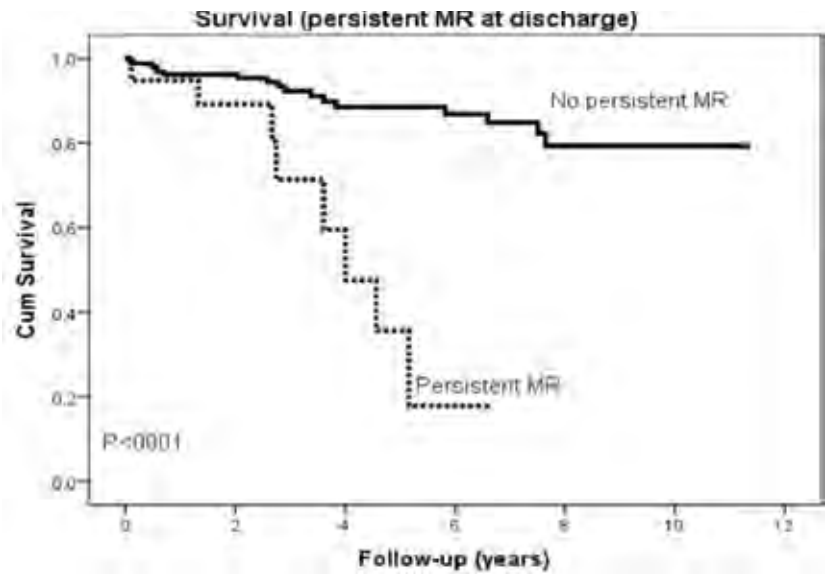
Continued from page 22

on survival, adverse valve-related events and clinical status; and 3- the evolution of MR overtime and possible predictors of persistence.

From Jan-99 to Dec-09, 3,339 patients underwent AVR for aortic valve disease. Of these, 255 were considered to have secondary MR greater than 2+, which was defined as dysfunction without structural abnormalities of the mitral apparatus, such as valve prolapse, significant calcification of leaflets or annulus, ruptured chordae and concomitant mitral stenosis. Patients were stratified into two groups (table 1), those with concomitant mitral valve surgery (group A, n=94, 36.8%) and those without (group B, n=161, 63.2%).

There was no difference in hospital mortality and morbidity between groups, although ECC and aortic clamping times were appreciably longer in the mitral surgery group.

Overall survival at 1-, 5- and 10-years was 93.0±2.8%, 84.2±4.2% and 76.7±5.7%, respectively, for group A, and 98.7±0.9%, 79.6±4.2% and 66.6±8.9%, respectively, for group B (P=NS). Only CAD, history of CVA, permanent AF, CRF and MR persistence emerged as independent predictors for overall mortality (Table 2). Patients who showed persistent MR early after surgery had severely compromised long-term survival (Figure 1). This was the most powerful independent predictor for late mortality (hazard ratio [HR]: 4.9; P=0.001).



Eight patients were reoperated, though only 2 underwent mitral valve surgery and both were from group A (early mitro-aortic endocarditis and late mitral repair failure nine years after surgery).

Early echocardiogram revealed improvement of the MR grade in nearly 82% of patients from group B (vs. 99% from group A). Overtime, there was an increase in the severity of MR, with 32.6% from group B showing persistent MR during late follow-up against 17.7% from group A (P=0.045). Table 3 shows the independent predictors of persistent MR at early and medium to long-term follow-up.

Secondary MR in the context of AVR can be treated with a high rate of mitral repair and with low mortality and morbidity.

The great majority of patients with secondary MR can expect to improve their MR degree early after isolated AVR and approximately 67% maintain their improvement in the medium to long-term. Patients who do not improve or have an important degree of MR by the first month after AVR are at risk of having significant persistent MR in the future and have severely compromised survival, hence should be closely followed and referred to mitral valve surgery early.

Patients in AF are also at risk for decreased survival and of persistent MR overtime, therefore they should have their mitral valve repaired simultaneously during AVR procedure and have AF ablation, if indicated.

Table 2 – Independent predictors for late mortality

Variable	HR	95% CI	P- value
CAD	2.97	1.32-6.70	0.009
Previous stroke/TIA	3.25	1.04-10.10	0.041
Permanent AF	2.74	1.24-6.06	0.013
CRF	3.01	1.22-7.40	0.016
MR persistence	4.90	1.92-12.60	0.001

CAD – Coronary artery disease; TIA – Transient ischemic attack; AF – Atrial fibrillation; CRF – Chronic renal failure; MR – Mitral regurgitation; HR – Hazard ratio; CI – confidence interval

Table 3 – Independent predictors for persistent MR at early and late follow-up

Variable	OR	95% CI	P value
At early FU (discharge)			
Aortic root enlargement	1.53	0.13-3.11	0.006
Inotropic support	1.34	0.20-2.83	0.012
No mitral surgery	2.81	1.16-20.30	0.009
At medium-long-term FU			
Atrial fibrillation	2.65	1.02-6.88	0.044
MR degree at discharge	1.92	1.19-3.09	0.007

FU – Follow-up; OR – Odds ratio; CI – confidence interval

References

1. Sabbah HN, Rosman H, Kono T, Alam M, Khaja F, Goldstein S. On the mechanism of secondary mitral regurgitation. Am J Cardiol 1993;72:1074-1076.

2. Moazami N, diodato MD, Moon MR, Lawton JS, Pasque MK, Herren RL, Guthrie TJ, Damiano RJ. Does secondary mitral regurgitation improve with isolated aortic valve replacement? J card Sur. 2004;19:444-448.

3. Wan CKN, Suri RM, Li Z, Orsulak TA, Daly RC, Schaff HV, Sundt TM. Management of moderate secondary mitral regurgitation at the time of aortic valve replacement: is concomitant mitral valve repair necessary? J Thorac Cardiovasc Surg 2009;137:635-640.

4. Ruel M, Kapila V, Price J, Kulik A, Burwash IG, Mesana TG. Natural history and predictors of outcome in patients with concomitant secondary mitral regurgitation at the time of aortic valve replacement. Circulation 2006;114[suppl I]:I541-546.

5. Absil B, Dagenais F, Mathieu P, Metras J, Perron J, Baillot R, Bause R, Doyle D. Does mitral regurgitation impact early or mid-term clinical outcome in patients undergoing isolated aortic valve replacement for aortic stenosis? Eur J Cardiothorac Surg 2003;24:217-222.

BioVentrix

The Rapid Evolution of a Transcatheter Hybrid Procedure for Heart Failure

Interest in developing more minimally invasive therapies continues to grow in the medical community. In the field of cardiac care, this has been demonstrated by the emergence of catheter-based procedures for atrial fibrillation, aortic valve replacement, closure of congenital and acquired septal defects, mitral valve repair, coronary artery disease and now renal denervation for hypertension. BioVentrix, Inc. (San Ramon, Calif., EACTS booth 92/93) has launched a unique product called the Revivant Myocardial Anchoring System™ at EACTS this year.

This product is designed for Less Invasive Ventricular Enhancement™ or LIVE™ procedures, enabling effective treatment of patients suffering from ischemic cardiomyopathy due to post anterior myocardial infarction (AMI) scarring. With the ongoing growth of the heart failure population worldwide, this technology appears to be extremely promising.

As the company is showcasing its flagship Revivent system at this meeting, the company's next generation transcatheter device therapy is nearing human clinical trials. This minimally invasive approach employs a combined endovascular and transthoracic delivery system that allows for a sternal sparing plication of the infarcted tissue. Intended for a combined hybrid surgical and cardiology team, it utilizes the identical implant technology as the original Revivent device. The resulting exclusion of acontractile scar should render the same promising results. Transeptal puncture is achieved under fluoroscopy with 17 G needles to facilitate advancement of a guide wire. The anchors are delivered retrograde through the right internal jugular vein and retrieved on the left side of the heart via a thoracoscopic port.

To date, BioVentrix has tested this concept in over 40 ovine models with impressive outcomes. The first human clinical experiences are expected to be reported at this meeting next year.

Continued from page 22

reconstruction versus sternal rewiring following failed sternal closure *J. Zeitani, E. Pompeo, M. Scognamiglio, C. Arganini, G. Simonetti, L. Chiariello (Italy)*

Discussant: P. Rajesh (Birmingham)

17:30 **Two-stage unilateral versus one-stage bilateral single-port sympathectomy for palmar and axillary hyperhidrosis** *C. Menna, M. Ibrahim, C. Andreetti, A. M. Ciccone, A. D'Andrilli, C. Poggi, F. Venuta, E. Rendina (Italy)*

Discussant: A. Sihoe (Hong Kong)

17:45 **Session ends**

Congenital heart disease

Professional Challenges

08:15 Is there a place for palliation in the management of Fallot's tetralogy?

Room 111

Moderators: V. Hraska, Sankt Augustin; D. Barron, Birmingham

08:15 **Introduction: Video repair** *V. Hraska (Sankt Augustin)*

08:30 **Methods of palliation** *D. Barron (Birmingham)*

08:45 **Surgery following primary right ventricular outflow tract stenting for Fallot's tetralogy: rehabilitation of small pulmonary arteries** *D. Barron, B. Ramchandani, J. Murala, O. Stumper, J. De Giovanni, T. Jones, J. Stickley, W. Brawn (United Kingdom)*

Discussant: A.J.J.C. Bogers (Rotterdam)

09:00 **Is there any need for the shunt in the treatment of tetralogy of Fallot?** *C. Arenz, A. Laumeier, S. Lutter, H. Blaschczok, N. Sinzobahamvya, C. Haun, B. Asfour, V. Hraska (Germany)*

Discussant: G. Stellin (Padua)

09:15 **What is the relationship between age and outcome in tetralogy of Fallot repair?** *B. Mimic, K. Brown, S. Khambadkone, T. Hsia, V. Tsang, M. Kostolny (United Kingdom)*

Discussant: G. Sarris (Athens)

09:30 **Neonatal right ventricle to pulmonary connection with autologous tissue as palliative procedure for pulmonary atresia with ventricular septal defect or severe tetralogy of Fallot** *S. Gerelli, M. Van Steenberghe, D. Bonnet, M. Bojan, P. Vouhé, O. Raisky (France)*

Discussant: F. Fynn-Thompson (Boston)

09:45 **Coffee**

10:15 Is there a place for palliation in the management of Fallot's tetralogy?

Moderators: J Comas, Madrid, G Sarris, Athens; M. Lo Rito, Birmingham

10:15 **How to promote growth of the right ventricular outflow tract and pulmonary artery** *V. M. Reddy (Stanford)*

10:30 **How to minimize postoperative repair morbidity** *M. Hazekamp (Leiden)*

10:45 **How to judge quality of repair in the operating room** *M. Vogt (Munich)*

11:00 **Impact of different management protocols on long-term outcome** *C. Caldarone (Toronto)*

11:20 **Discussion**

11:50 **Presidential address**

12:30 **Lunch**

Abstracts

14:15 Aspects of valve repair

Room 111

Moderators: B. Kreitmann, Marseille; B. Asfour, Sankt Augustin

14:15 **Repair of incompetent truncal valve: early and mid-term results** *G. Perri, S. Filippelli, A. Polito, D. Di Carlo, S. Albanese, A. Carotti (Italy)*

Discussant: B. Asfour (Sankt Augustin)

14:30 **Reoperation for left atrioventricular valve dysfunction after repair of atrioventricular septal defect** *E. Belli, M. Pontailler D. Kalfa, M. Ly, E. Garcia, E. Le Bret, R. Roussin, V. Lambert (France)*

Discussant: C. Margarita (Marseille)

14:45 **Repair of Ebstein's anomaly in neonates and small infants: impact of right ventricle exclusion** *S. Sano, S. Kasahara, Y. Fujii, S. Arai (Japan)*

Discussant: O. Ghez (London)

15:00 **A 17-year experience with mitral valve repair with artificial chordae in infants and children** *S. Oda, T. Nakano, K. Hinokiyama, D. Machida, H. Kado (Japan)*

Discussant: V. Tsang (London)

Continued on page 26

Vascular: Professional Challenges 08:15–09:45 **Room 113**

The role of Willis circle variations during unilateral selective cerebral perfusion: a study of 500 circles[1]

Vassil Papantchev *University hospital "St. Ekaterina", Medical University, Sofia, Bulgaria*

During unilateral selective cerebral perfusion (uSCP) with cannulation of right axillary artery or brachiocephalic trunk, the brain receives blood only via right common carotid artery and right vertebral artery. The assumption for protective effect of uSCP is based on the understanding that collateral circulation, mainly through arterial circle of Willis (CW), is sufficient to maintain adequate perfusion in the contralateral (left) hemisphere (figure 1). However, variations of CW exist in at least 50% of the people. It is also known that these variations usually affect more than one segment of the circle.

In this respect the aim of our work was to study the variations of CW, which could have an impact on hemodynamics during uSCP.

Between May 2005 and March 2012 a total number of 500 CWs were collected. Two hundred and fifty CW were examined during routine medico-legal autopsy, while other 250 circles were studied with CT angiography.

We observed seven distinct type of CW, that could cause hypoperfusion during uSCP and thus to vitiate its protective effect. Results are summarized on figure 2, where hypo/aplastic vessels are present as missing segments, vessels at risk of hypoperfusion during uSCP are presented in black and cerebral zone at risk of hypoperfusion is present hatched. Briefly:

- As Type IA were classified all CWs with hypo- or aplasia of the left posterior communicating artery (PcomA; found in 35.6% of all cases);
- As Type IB were classified all CWs with hypo- or aplasia of of the anterior communicating artery (AcomA; found in 2% of all cases);
- As Type IIA were classified all CWs with hypo- or aplasia of both the left PComA and AComA (found in 4.8% of all cases);
- As Type IIB were classified all CWs with hypo- or aplasia of the left P1 or right vertebral artery (VA; found in 9.2% of all cases);
- As Type IIIA were classified all CWs with hypo- or aplasia of the right A1 (found in 6% of all cases);
- As Type IIIB were classified all CWs with hypo- or aplasia of both the right VA and AComA (found in only 0.2% of all cases);
- As Type IV were classified all CWs with hypo- or aplasia of both right A1 and right VA or both right A1 and left P1 (found in 0.8% of all cases);

These seven variant CW types were present in 58.6% of all examined circles. The presence of one of variant circles' types, reported here, could explain the unfavorable postoperative psychical, sensor, and/or motor deficits, which occurs in some patients after uSCP.

Our current findings support the need of extensive preoperative examination (including CT angio) and meticulous intraoperative monitoring of cerebral perfusion during uSCP (NIRO etc).

Finally, our present data support the superiority of bilateral SCP (right axillary + left carotid perfusion) over uSCP, because most of variations described by us do not have hemodynamic significance during bilateral SCP.

Reference

1 This work is supported under Grand 2011 program of Medical University, Sofia with Contract No 19/ Project 20

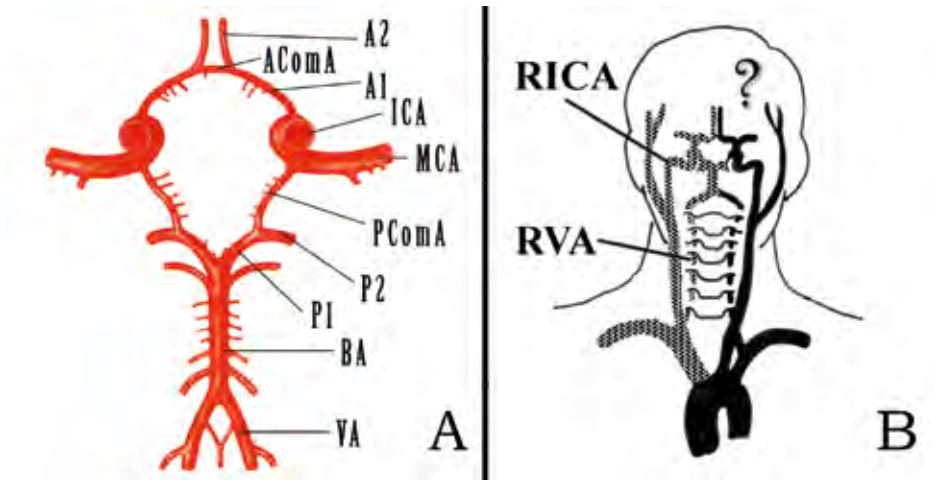


Figure 1

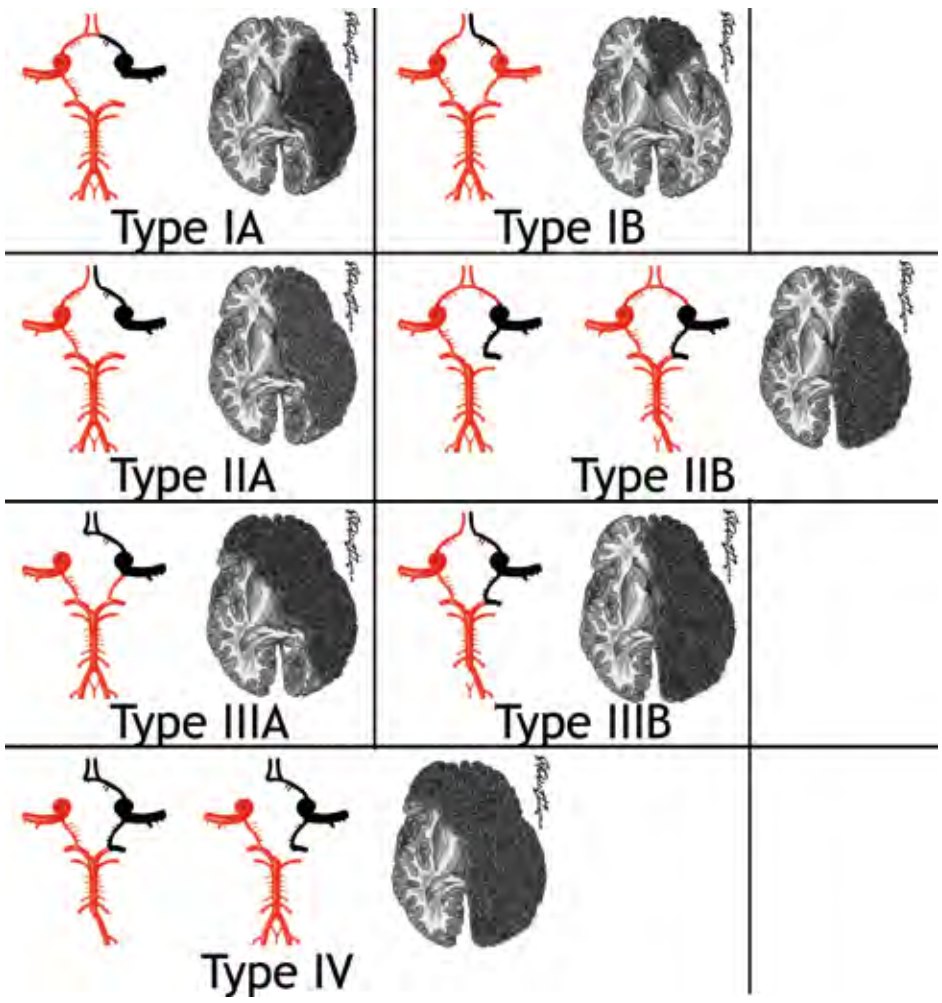
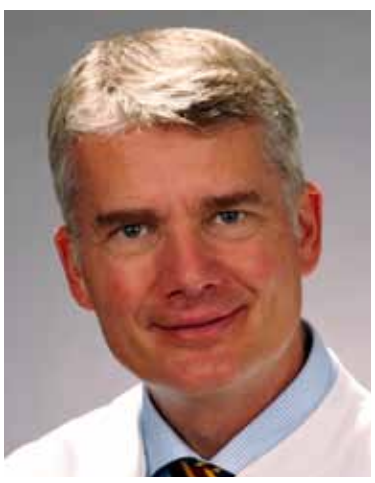


Figure 2

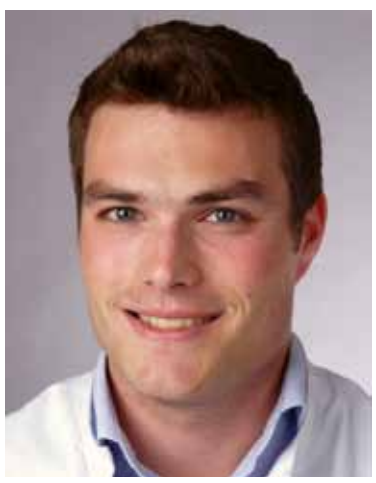
Vascular: Professional Challenges 08:15–09:45 **Room 113**

Comparative analysis of available antiplatelet therapies in current clinical management. What agents to choose from and why

Alexander Bernhardt and Hermann Reichenspurner *University Heart Center Hamburg/ Germany*



Vassil Papantchev



Alexander Bernhardt

Platelets play a major role in the history and progression of coronary artery disease. These platelets rapidly adhere to the exposed subendothelial area, where they become activated by contacting with stimulants. Based on the molecular targets, antiplatelet drugs are classified as Thromboxane A2 pathway blockers, ADP receptor antagonists, GPIIa/IIIb antagonists, adenosine reuptake inhibitors, phosphodiesterase inhibitors, thrombin receptor inhibitors, and others. Coronary artery bypass graft (CABG) surgery is an important therapeutic approach to treat coronary artery disease. Long-term success after CABG depends on the patency of the bypass vessels. Since platelets play a crucial role in the pathogenesis of thrombosis in the blood vessels, experience with new antiplatelet drugs is mainly based on trials on PCI. After the CURE trial aspirin and clopidogrel were the gold-standard for patients with acute coronary syndrome (ACS). In the TRITON TIMI-38 trial, aspirin was given with either prasugrel or clopidogrel. Prasugrel had favourable mortality, despite an increase in observed bleeding, platelet transfusion, and surgical re-exploration for bleeding. Cautious indication should be made in patients with a history of stroke. Recently, the TRILOGY trial found no difference in outcomes between clopidogrel and prasugrel. In the PLATO trial aspirin was given with either ticagrelor or clopidogrel. Ticagrelor showed a reduction in primary end-point with no significant increase in bleeding rates. AV-Blockage is a contraindication for ticagrelor due to ventricular breaks, which were observed in some patients. Current guidelines recommend ticagrelor for NSTEMI patients. Prasugrel and aspirin are the favourable combination in STEMI and diabetics. Administration of clopidogrel is only recommended in patients with contraindications for other antiplatelet drugs. To date, large, prospective trials on antiplatelet therapy in CABG patients are lacking. Results are only available for retrospective subgroup analysis in high- risk patients (STEMI). Both, prasugrel and ticagrelor showed a significant reduction in mortality compared to clopidogrel.

Cardiac: Abstracts 10:15–11:45 **Room 115**

Who benefits from early VAD implantation?

Takeshi Komoda
Deutsches Herzzentrum Berlin, Berlin Germany

In Germany, there is a dilemma in the therapy for heart transplant (HTx) candidates with end-stage heart failure. Earlier ventricular assist device (VAD) implantation may reduce the risk of dying from heart failure; however, once the patient receives a VAD, the possibility of receiving HTx recedes.

If a patient who was stable on inotropic support after cardiac decompensation and received a VAD after urgency listing for HTx, unfortunately died, the implantation of a VAD at an earlier stage would have rescued the patient (plan #1 in Figure 1). However, earlier VAD implantation may deprive the patient of a chance for HTx after urgency listing. In Germany, most HTx candidates receive HTx in urgent status, and patients who receive a VAD are awarded urgent status only after the occurrence of life-threatening device-related complications. We investigated the validity of early VAD implantation from the viewpoint of heart allocation in a retrospective cohort study.

Among 576 adult candidates for de novo HTx who were newly listed as T (transplantable) by Eurotransplant without VAD support in our center, 310 progressed to a critically ill status, i.e., primarily urgency listing (Group U, n=208) or primarily VAD implantation (Group VAD, n=102). In the latter group, patients who received a continuous flow LVAD (left ventricular assist device) at INTERMACS level 3 (i.e., stable on inotropic support) were assigned to Group cLVAD3 (n=50).

Survival on the waiting list in Group U was significantly better than in Group cLVAD3. Freedom from HTx in Group U was significantly lower than in Group cLVAD3. Accordingly, the survival rate at the median waiting time for HTx in Group cLVAD3 (43.7% at 24.9 months) was much lower than that in Group U (95.0% at 1.7 months).

Overall survival of Group U was significantly better than that of cLVAD3 (57.3% vs. 35.8% for 5-year survival, p=0.026). Even if the overall survival rates were to be equal between the two groups, the quality of life and risk of device-related complications may be different because patients in Group U receive HTx much earlier than those in Group cLVAD3 and patients in the latter group have to wait for HTx under mechanical circulatory support until life-threatening device-related complications occur.

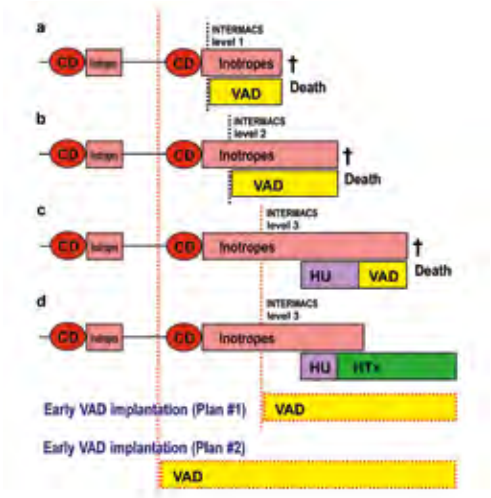


Figure 1: Graphic of early VAD implantation plans #1 and #2. CD: cardiac decompensation, HU: high urgency status

In the above-mentioned circumstances, we cannot recommend earlier VAD implantation in HTx candidates at INTERMACS level 3 in good clinical condition, who are good candidates for urgency listing. As an alternative to early VAD implantation in the patients at INTERMACS level 3, we postulate VAD implantation prior to cardiac decompensation (plan #2 in Figure 1). When a VAD is implanted in HTx candidates who are in stable status and without inotropic support, this may prevent potential death following VAD implantation at INTERMACS levels 1, 2, and 3 (as shown in the cases a, b, and c in Figure 1). However, the validity of VAD implantation in these patients should be investigated further in future studies.

NeoChord completes enrollment for 'TACT' clinical trial

Acute and chronic results using NeoChord's sternal-sparing, beating-heart, mitral valve repair system to implant artificial chordae tendinae are encouraging.


John Seaberg

NeoChord, a medical device company focused on minimally invasive mitral valve repair, has completed enrollment for its ongoing 'TACT' (Transapical Artificial Chordae Tendinae) clinical trial in Europe.

"The 30-patient TACT trial now has numerous patients showing one- and even two-year durability of repair with clinically significant reductions in mitral regurgitation. Acute procedure success rates in the second half of the trial were 94% with excellent early durability results. These combined results suggest that NeoChord will make a strong contribution in the evolving field of mitral repair," said John Seaberg, Chairman and CEO, NeoChord.

"We are very pleased that we have successfully concluded enrollment into our TACT trial, as these patients suffering from mitral regurgitation are potentially avoiding the complications and trauma associated with traditional open-chest surgery performed on a stopped heart," added John Zentgraf, VP of R&D (vice president of research and development) at NeoChord. He added that "We look forward to conducting additional studies via the TACT Registry in Europe commencing in early 2013."

"Follow-up visits at 12 and 24 months post-op confirm that the vast majority of patients operated on using the NeoChord technology continue to show resolution or significant reduction of mitral regurgitation up to two years after the procedure," said Giovanni Speziali, M.D., a cardiac surgeon who is the primary inventor of the NeoChord device. "These results compare favorably to those obtained with traditional surgical repair of severe mitral regurgitation," said Dr. Speziali. He added that "I am very pleased with the progress we have made in both patient selection and procedure methodology."

The NeoChord procedure was developed to treat mitral prolapse caused by ruptured or elongated chordae tendinae — the primary cause of degenerative mitral regurgitation —— via minimally invasive implantation of artificial chordae tendinae. The technology was developed by Dr. Speziali, University of Pittsburgh Medical Center, along with Richard Daly, M.D., a cardiac surgeon from Mayo Clinic, and Charles Bruce, M.D., cardiologist, also of Mayo Clinic. The technology is licensed exclusively to NeoChord Inc.

Based in Eden Prairie, Minn., NeoChord is a privately held medical technology company focused on advancing the treatment of mitral regurgitation. The Company expects to commercialize a surgical device for minimally invasive mitral valve repair via surgical implantation of artificial chordae tendinae. Degenerative mitral regurgitation occurs when the leaflets of the heart's mitral valve do not close properly, usually due to rupture or elongation of the chordae tendinae (chords) that control the leaflets' motion. During pumping, the "leak" in the mitral valve causes blood to flow backwards (mitral regurgitation) into the left atrium, thereby decreasing blood flow to the body. Mitral regurgitation is a progressive disease that left untreated can result in atrial fibrillation, congestive heart failure, and death. For more information, visit: www.NeoChord.com. The NeoChord device is an investigational device and is not available for commercial use.

Continued from page 24

15:15 **Preliminary results of the Ross procedure associated with autograft reinforcement using a reimplantation technique** *M. Ly, D. Kalfa, A. Serraf, E. Garcia, A. Lipey, A. Baruteau, E. Belli (France)*
Discussant: J. Hörer (Munich)

15:30 **Outcome of a valve repair-oriented strategy for the aortic valve in children** *A. Abousteit, N. Prior, G. Soda, P. Reddy, R. Dhannapuneni, P. Venugopal, J. Lim, N. Alphonso (United Kingdom)*
Discussant: R. Prêtre (Zürich)

Focus Session

16:15 **Heart rejuvenation**
Room 111
Moderators: W. Brawn, Birmingham; J. R. Pepper, London; D. J. Chambers, London; M. Kanani, London

16:15 **Cardioplegia** *D. Chambers (London)*
16:35 **Stem cells** *P. Menasche (Paris)*
16:55 **Ex vivo heart and lung preservation** *A. Simon (Harefield)*
17:15 **Preconditioning and its future**
V. Venugopal (London)

17:45 Session ends

Vascular disease

Professional Challenges

08:15 **Aortic arch disease I**
Room 113
Moderators: C. A. Mestres, Barcelona; P. P. Urbanski, Bad Neustadt

08:15 **State of the art in aortic arch surgery** *J. Bachet (Abu Dhabi)*
08:30 **Mid- to long-term results after aortic arch repair using a four-branched graft with antegrade selective cerebral perfusion** *S. Numata, Y. Tsutsumi, O. Monta, S. Yamazaki, H. Seo, R. Sugita, S. Yoshida, H. Ohashi (Japan)*
Discussant: M. Pasic (Berlin)
08:45 **Is the branched graft technique better than the en bloc technique for total aortic arch replacement?** *M. Shrestha, A. Martens, S. Behrend, I. Maeding, A. Haverich (Germany)*
Discussant: D. Loisance (Paris)
09:00 **Aortic arch reoperation: a single-centre experience of early and late outcome in 57 consecutive patients** *M. Moz, S. Leontyev, M. Borger, M. Misfeld, F. Mohr (Germany)*
Discussant: B. Mochtar (Maastricht)
09:15 **Open aortic arch replacement in the era of endovascular techniques** *P. Urbanski, M. Raad, A. Lenos, P. Bougioukakis, M. Zacher, A. Diegeler (Germany)*
Discussant: H. Jakob (Essen)
09:30 **The role of Willis circle variations during unilateral selective cerebral perfusion: a study of 500 circles** *V. Papantchev, V. Stoinova, A. Alexandrov, D. Todorova-Papantcheva, S. Hristov, D. Petkov, G. Nachev, V. Ovtscharoff (Bulgaria)*
Discussant: T. Sioris (Tampere

09:45 **Session ends**

Simulation Workshop

08:30 **TEVAR Simulation Workshop**
Room Vallvidrera, Hotel AC Barcelona Forum

Objectives:
- After the course, participants will be able to describe the rationale for doing TEVAR and list the procedural steps of the implantation of a Valiant Captivia stent graft for a thoracic aortic aneurysm and/or rupture

Participant Profile:
- Surgeons interested in understanding the endovascular treatment of the thoracic aorta with the Medtronic Valiant Captivia stent graft with no/limited experience in this field

Logistics:
- Slots of 1 hour for two registered Annual Meeting delegates at a time. Registration on a first-come, first-served basis via the Information Desk in the main registration foyer area

Note: This programme is repeated on Tuesday 30 October at the same time and in the same venue

16:30 **Session ends**

Simulation Workshop

08:30 **Mentice Simulation Course**
Room Tres Torres, Hotel AC Barcelona Forum

Objectives:

Continued on page 28

Congenital: Professional Challenges 10:15–11:45 **Room 111**

Tetralogy of Fallot: How to minimize postoperative repair morbidity

Mark Hazekamp *Leiden University Centre and Amsterdam Academic Medical Centre, The Netherlands*


Mark Hazekamp

Tetralogy of Fallot (TOF) is the best studied congenital heart defect worldwide. TOF repair started early in the 1950'ies and mortality has dramatically decreased to 1-2% in the current era.

Although postoperative mortality is very low, morbidity remains significant. The major determinants of post-repair morbidity are duration of mechanical ventilation, length of ICU and hospital stay. Pleural fluid drainage may be necessary and delays discharge from hospital.

Diastolic dysfunction of the RV results in high RA pressure and prolonged pleural fluid production. Some degree of LV impairment is common and hemodynamics may be compromised after surgery. Volume administration is frequently needed and prolongs pleural fluid drainage and ICU stay.

The acute change from a pressure-loaded to a mainly volume-loaded RV following repair is an important reason for postoperative morbidity. RV hypertrophy increases with time and results in diastolic dysfunction. Transannular patch augmentation is necessary in a majority and incising into the RV adds to functional loss, especially if this is used for transventricular VSD closure. Transannular patching results in pulmonary valve insufficiency and accounts for another insult to RV function.

A second cause for RV failure after TOF repair is increased pulmonary vascular resistance. Pulmonary arteries (PA's) mature in the first few months of life. Later, they may remain small or show obstruction after previous (Blalock) shunt placement.

To minimize postoperative morbidity we thus need to focus on both RV and pulmonary arteries. If TOF repair is performed late, the RV will be hypertrophic with diastolic dysfunction. If TOF repair is performed in the first three months of life, PA vasculature has not fully matured and diameters may be on the small side. Both situations lead to postoperative morbidity. Timing is important and although TOF repair can be done in the first three months without increased mortality, morbidity is more severe and prolonged than when repair is performed later. Furthermore, symptoms are uncommon in the first months and very early repair is usually not necessary. Waiting longer than one year increases RV hypertrophy and does not carry further benefits.

Surgical techniques should be designed to minimize RV damage: Transatrial VSD closure is always possible and resection of RVOT muscle tissue can be performed effectively by transpulmonary-transatrial approach. Pulmonary insufficiency from transannular patching can be reduced by making the patch not too wide, by preserving the native pulmonary valve whenever possible and by adding a monocusp.

In Leiden the policy is to repair TOF preferably at 5 to 10 months. If symptoms occur earlier, a modified Blalock-shunt is placed. Transpulmonary-transatrial approach is used to minimize the RVOT incision. When the RVOT is narrow over a longer distance, it can be necessary to extend the incision further into the RV. In these cases we use a transannular patch with (Gore-tex) monocusp valve to protect the RV as much as we can. Since long we have stopped doing very early (under three months of age) TOF repair when we observed that this led to longer and more complicated ICU stays.

Thoracic: Abstracts 10:15–11:45 **Room 133/134**

Prognostic Stratification of Stage IIIA pN2 Non-small Cell Lung Cancer by Hierarchical Clustering Analysis of Tissue Microarray Immunostaining Data

An Alpe Adria Thoracic Oncology Multidisciplinary Group Study (ATOM 014)
G. Aresu, G. Masullo, E.Baracchini, A. Follador, F. Grossi, A. Morelli

Patients with stage IIIA non-small cell lung cancer (NSCLC) involving ipsilateral mediastinal nodes (pN2) represent a heterogeneous population with differing clinical presentations and prognoses.

Treatment guidelines for stage IIIA pN2 NSCLC are evolving, and the management of these patients remains challenging.

Sub classification of this heterogeneous population, and the identification of distinct prognostic subgroups, may allow the optimization of clinical trial design, with the potential to improve treatment outcomes.

Molecular markers, including those involved in the regulation of cell proliferation, differentiation, apoptosis, and in invasion, angiogenesis, and metastasis, have the potential to further refine this process.

In this study, we used immunohistochemistry on tissue microarray (TMA) to evaluate the expression and prognostic significance of a panel of 10 molecular markers in patients with stage IIIA pN2 NSCLC treated surgically with curative intent who did not receive adjuvant chemotherapy or biologic therapies.

The panel of markers included cell cycle regulators (cyclin D1 and cyclin B1), growth factor receptors (c-erbB-1 and c-erbB-2, c-kit), antiapoptotic factors (bcl-2 and survivin), an enzyme involved in the arachidonic acid cascade with angiogenic properties (cyclooxygenase-2 [COX-2]), and proteins involved in the degradation of the extracellular matrix metalloproteinases (MMPs)-2 and -9.

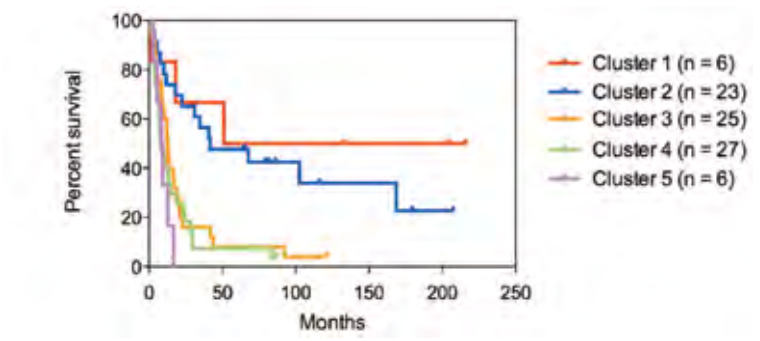


Figure 1: overall survival by cluster based on hierarchical clustering analysis

Methods

Primary tumour tissue microarrays (TMAs) were constructed and sections used for immuno-histochemical analysis of epidermal growth factor receptor, ErbB-2, c-kit, cyclo-oxygenase-2, survivin, bcl-2, cyclin D1, cyclin B1, metalloproteinase (MMP)-2, andmmP-9. Univariate and multivariate analyses and unsupervised hierarchical clustering analysis of clinical pathologic and immune-staining data were performed.

Results

Bcl-2 (P<0.0001) and cyclin D1 (P=0.015) were more highly expressed in squamous cell carcinoma (SCC), whereasmmP-2 (P=0.009),mmP-9 (P=0.005), and survivin (P=0.032) had increased expression in other histologic subtypes. In univariate analysis, SCC histology and cyclin D1 expressions were favourable prognostic factors (P=0.015 and P<0.0001, respectively); by contrast,mmP-9 expression was associated with worse prognosis (P=0.042). In multivariate analysis, cyclin D1 was the only positive prognostic factor (P<0.0001). Unsupervised hierarchical clustering analysis of TMA immune-staining data identified five distinct clusters. They formed two subsets of patients with better (clusters 1 and 2) and worse (clusters 3, 4, and 5) prognoses, and median survival of 51 and 10 months, respectively (P<0.0001). Fig 1. The better prognosis subset mainly comprised patients with SCC (80%).

Conclusion

Hierarchical clustering of TMA immune-staining data using a limited set of markers identifies patients with stage IIIA-pN2-NSCLC at high risk of recurrence.

The integration of clinical parameters with molecular profiling data will become increasingly important in the management of patients with NSCLC, to make an accurate diagnosis and to tailor treatment decision to the individual patient.

Thoracic: Abstracts 10:15–11:45 **Room 133/134**

Enzyme-linked immunosorbent spot for postoperative immununosupression monitoring of patients with lung cancer

P.Rybojad, A.Jabłonka, B.Wilczyńska, J.Tabarkiewicz *Medical University of Lublin, Poland*

Despite extensive research, the role of the individual components of the immune system in host-neoplasm interactions is not fully specified. The anti-cancer response is often inefficient because of tumor cells' contraction. However if patient is treated with surgery, chemotherapy or radiotherapy, changes of immunological parameters are very difficult to be interpreted, because too many variables can influence the current immunological status. In the cancer bearing patients we can observe two antagonistic phenomena: anti-cancer immune response and cancer induced immunosuppression. Eradication of tumour shall stop the negative influence of neoplastic cells and boost immune response eliminating residual cancer cells. Unfortunately possible severe trauma, associated with invasive surgical procedures may induce down-regulation of immune reaction and promote recurrence of disease. The phenomenon of immunosuppression induced by surgery is widely described as the adverse effect of surgical in-

Continued on page 27

P. Rybojad

J. Tabarkiewicz

Continued from page 26

terventions on leukocytes and secretion of several cytokines. Three types of laboratory assays: tetramers, intracellular flow cytometry and enzyme-linked immunosorbent spot (ELISPOT) assay have emerged as first-line methods for monitoring of specific immune response. The ELISPOT method permits enumeration of individual antigen-specific cells through detection of antigen-triggered secretion of cytokines. In contrast to supernatant-based assays (ELISA or beads arrays), the proteins are immediately captured, before they evade detection by binding to receptors, diluting in the supernatant, or degrading by proteases. Recent clinical trials focused on cancer vaccines, tested in a variety of neoplasms, have proved that ELISPOT can be treated as a golden method for monitoring of specific anti-tumour immune response. The aim of our study was monitoring of changes in specific and non-specific immune response in post-operative period in 30 patients with resected lung cancer. We used ELISPOT for enumeration of cells secreting pro- and anti-inflammatory mediators (IFN-y, granzyme B, perforines, IL-4, IL-5, IL-10, IL-17a). Best of our knowledge we present the first report assessing the impact of surgical treatment on the specific immune response against tumour antigens.

Our results suggest an immunosuppressive effect of surgery on the specific and nonspecific immune stimulation. This effect is particularly expressed in relation to Th1-type immunecal response which is associated with direct elimination of cancer cells. Another negative fact is the increase of the secretion of immunosuppressive IL-10 in response to cancer antigens.

The postoperative immunosuppression is the most noticeable on the first day after surgery. It returns to pre-operative level after approximately four weeks. This occurrence is extremely unfavorable, considering the possibility that surgical manipulation may result in introducing tumor cells into the bloodstream. These phenomena can be associated with an increased risk of metastasis and recurrence of the disease. Additionally, the weakening of non-specific secretion of IFN-γ, granzyme B and perforines may elevate the risk of infectious complications after surgery. The results obtained by our team may have significant implications for both planning and preventing of perioperative oncological and bacteriological treatment. Additionally our results open the gates for intensive research on pre- and postoperative immunostimulation, which will be able to prevent surgery induced down-regulation of immune response.

Cardiac: Abstracts 10:15–11:45 **Room 114**

Mitral valve repair using multiple MitraClips

Perioperative and short-term results using the "zipping" technique

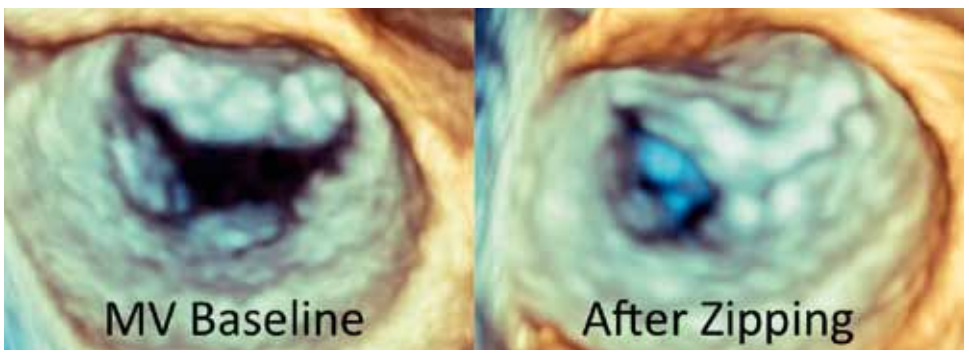
Stephan Kische *institute*

MitraClip has been recently proposed to treat mitral valve regurgitation (MVR). In patients with extreme ventricular dilatation and coaptation tethering, placement of a single clip in the middle of the anterior and posterior leaflets of the mitral valve may not be technically possible and/or may lead to incomplete MVR correction.

In such patients we have developed a ´zipping´ technique. Multiple clips are placed starting from the postero-medial towards the antero-lateral commissure (see picture). In this way leaflets "grasping" is facilitated and tension homogeneously distributed along the new coaptation line. Fourteen patients with severe MVR secondary to extensive leaflet tethering were treated by ´zipping´. Logistic Euro-SCORE was 27.7±8.7.

Stephan Kische

A minimum of 3 clips per patient was placed. At the end of the procedure MVR passed from 3.6±0.5 to 0.9±0.4 (p<0.0001). Dobutamine echocardiography was performed before discharge. Although MVR remained stable, transmitral gradients (Rest 3.4±0.6 vs. Stress 4.0±0.5mmHg; p<0.0001) and MV orifice area (Rest 2.9±0.2 vs. Stress 3.9±0.4cm2; p<0.0001) increased significantly. At 6-month MVR degree was unchanged. One patient died for cardiac causes and all the surviving patients are in NYHA I-II. Our preliminary data in a limited number of patientes suggests that ´Zipping´ using multiple MitraClips can be performed safely in patients considered untreatable following the standard clipping technique. Progressive approximation of the MV leaflets starting from the medial commissure and using multiple MitraClips can lead to significant reduction of MVR. Application of the ´zipping´ technique does not seem to lead to pathological increase in MV gradients during midterm follow-up.



Continued from page 26

- Utilizing the endovascular Mentice VIST-Lab simulator for an introduction to EVAR. You will perform a variety of different EVAR focused anatomies utilising the real devices in a safe and controlled environment.

Participant Profile:

- Ideally the participants will have at least a basic knowledge of wire and catheterisation skills. The participants will be able to perform an EVAR on a variety of different anatomies with 2 or 3 part graft systems.

Logistics:

- Slots of 1 hour for three registered Annual Meeting delegates at a time. Registration on a first-come, first-served basis via the Information Desk in the main registration foyer area.

Note: This programme is repeated on Tuesday 30 October at the same time and in the same venue

17:00 **Session ends**

Simulation Workshop

08:30 **TEVAR pre-case planning course with OsiriX**

Room Montjuic, Hotel AC Barcelona Forum

Objectives:

The objective of the course is to teach the participants how to:

- import images from a CT scan
- view one or multiple series of images from a study
- navigate through the most important commands and toolbars
- customize toolbars
- use the main analysis and measurement tools
- precisely perform the measurements with the MultiPlanar Reconstruction Display (MPR) and 3D volume rendering
- export images, videos or DICOM files

In TEVAR, pre-case planning is key for achieving clinical success – failing to plan is planning to fail. Before entering the operating room, an analysis of the case is mandatory to properly understand the pathology and choose the optimal treatment. This course aims to provide an understanding of the use of OsiriX for the analysis of the pathologies of the thoracic aorta and the planning of potential treatments. OsiriX is becoming a reference in the endovascular market because it is easy to use, it includes all the tools needed for analysis and pre-case planning such as multiplanar reconstruction, 3D reconstruction, centerline and sizing tools; more, a free version is available. The course aims to be predominantly practical. After a brief introduction, the participants will be using individual Mac computers to go through the course and practise all the concepts explained.

Logistics:

The course is restricted to 25 registered Annual Meeting delegates.

Registration:

Fee 80 Euros including VAT. Registration on a first-come, first-served basis via the EACTS User area

17:00 **Session ends**

Professional Challenges

10:15 **Aortic arch disease II: Video session on all proven approaches for effectively treating the arch**

Room 113

Moderators: W. Harringer, Braunschweig; T. Carrel, Berne

10:15	**Arch rerouting – single**	*M. Czerny (Berne)*
10:25	**Arch rerouting – double**	*M. Grimm (Vienna)*
10:35	**Arch rerouting – triple**	*E. Weigang (Mainz)*
10:45	**Conventional arch – island**	*R. De Paulis (Rome)*
10:55	**Conventional arch – branched**	*P. Urbanski (Bad Neustadt)*
11:05	**Conventional elephant trunk**	*Y. Okita (Kobe)*
11:15	**Frozen elephant trunk**	*G. Weiss (Vienna)*
11:25	**Should aortic arch replacement be performed during initial surgery for aortic root aneurysm in patients with Marfan syndrome?**	*F. Schoenhoff, A. Kadner, M. Czerny, J. Schmidli, T. Carrel (Switzerland)*
	Discussant: T. Dessing (Nieuwegen)	
11:40	**Discussion**	
11:50	**Presidential address**	
12:30	**Lunch**	

Abstracts

14:15 **Elephant trunk: conventional and frozen**

Room 113

Moderators: C. Hagl (Munich); M. Karck, Heidelberg

14:15	**Thirty years of classical elephant trunk: single-centre experience**	*M. Shrestha, H. Krueger, A. Martens, F. Fleissner, F. Ius, A. Haverich (Germany)*
	Discussant: M. A. A. M. Schepens (Brugge)	

Continued on page 30

Cardiac: Focus Session 10:15–11:45 **Room 122/123**

Slow valve deployment during angiographic visualization of the aortic root during TAVI – the "Berlin addition"

Berlin-TAVI-Team *Deutsches Herzzentrum Berlin, Berlin, Germany*

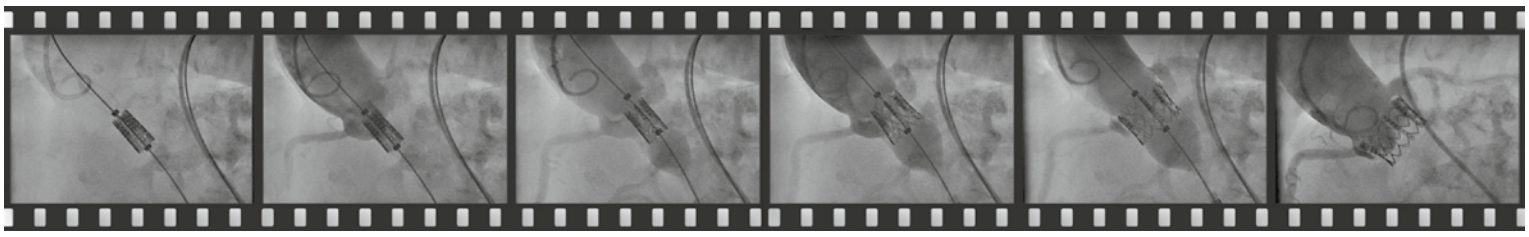
Berlin-TAVI-Team

Simultaneous angiographic control during slow and gradual valve deployment significantly improved the crucial part of the transcatheter aortic valve implantation process. The position of the valve can be precisely determined during valve deployment by pushing or pulling the catheter with the mounted prosthetic valve. Angiography enabled perfect visualization of the position of the prosthetic valve and its relationship to the coronary arteries throughout the valve deployment. Contrast medium remains in the proximal part of the ascending aorta (aortic root) due to "no flow" through the aortic valve during rapid pacing. In this manner the procedure is completely under control and under visualization.

Modified Implantation Technique: The proper position of the valve is determined according to the annular plane. The tubus is disconnected from the respirator, rapid pacing is started and the balloon is initially expanded by about 30% – 40% and in this moment angiography is performed (either 10ml or 20 ml of contrast medium) via a pigtail catheter that is previously pulled back from the sinus of Valsalva 2-3cm distally into the mid-part of the ascending aorta just above the sinotubular junction. The position of the valve is corrected if necessary. Then the balloon is further inflated to about 60% – 70% and the valve is opened about 50-60% so that second fine correction of the valve position is still possible. The ideal position of the valve is obtained by precise correction of the position relating to the coronary artery ostia, native valve, and native aortic valve annulus, which in this way are perfectly visualized. Finally, forced complete inflation of the balloon is performed and the valve deployed in the desired position.

Usually, only one shot of contrast medium into the ascending aorta for angiography is necessary during valve deployment. Rarely, especially in patients with a high risk for occlusion of the right coronary artery, such as in patients with a bulky leaflet or short distance to one of the coronary arteries, precise positioning and deployment of the valve are very slow and a second injection of the contrast medium into the ascending aorta is required. Although the inflation of the balloon during valve deployment is performed slowly, the valve deployment remains a very short procedure, lasting only between 5 and 10 seconds.

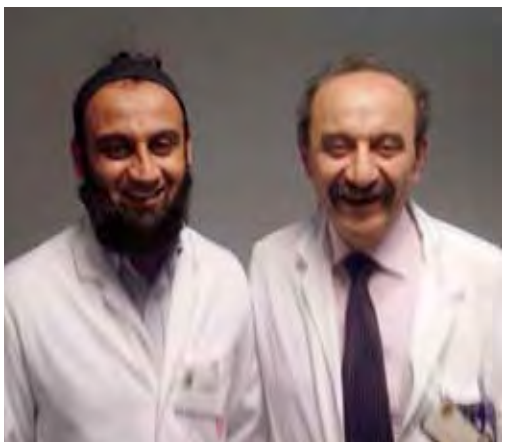
Angiographic visualization improves the safety of transapical aortic valve implantation and simplifies valve positioning and the valve deploying technique. It transforms the procedure from a partially uncertain and "half blind" procedure to a highly controllable technique that is more congruent with the "surgical way of thinking" to be able to "control all parts of a procedure." We highly recommend that this simple but very effective and helpful modification be used for all transcatheter valve implantations, as for the transfemoral approach for aortic valve implantation. We have been using the modified technique since 2008 in almost 800 our TAVI patients. The technique was published in the Annals of Thoracic Surgery in 2010. (Pasic M, Dreysse S, Drews T, et al. Improved technique of transapical aortic valve implantation: "The Berlin addition". *Ann Thorac Surg* 2010;89:2058-60.)



Cardiac: Abstracts 10:15–11:45 **Room 112**

Long-term outcome of valve repair for concomitant aortic and mitral insufficiency

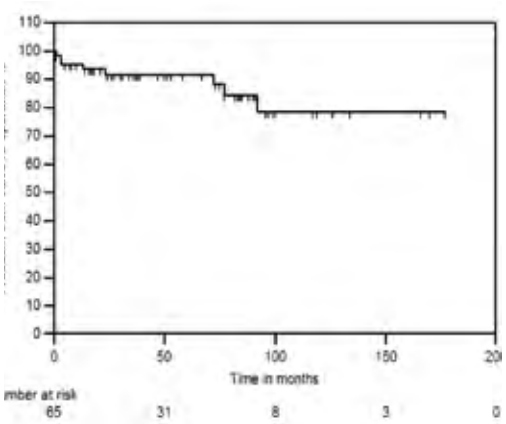
Hunaid A Vohra, Robert N Whistance, Laurent deKerchove, Jawad Hechadi, David Glineur, Phillipe Noirhomme, Gebrine El Khoury *Department of Cardiovascular and Thoracic Surgery, Cliniques Universitaires Saint-Luc, Brussels, Belgium.*



Hunaid Vohra (left) and Gebrine El Khoury

Traditionally, concomitant aortic (AI) and mitral valve insufficiency (MI) has been treated with double valve replacement (DVR). Although mitral valve repair (MVr) for MI is the standard of care, the outcomes of aortic valve repair (AVr) are improving. This is due to better understanding of the functional anatomy of AV, AI mechanisms and development of a classification system. Dr Vohra performed this research during his fellowship at Brussels. He evaluated outcomes of concomitant AVr/MVr in a specialist centre performed over a 13-year period. Sixty five patients were identified. Mean age was 56.4±15.8 years and 70% were males. There were 8 bicuspid AV (12%). Indications for AVr were AI>2+ (n=30, 46%), AI ≥2+ with aortic dilatation (n=20, 30%) and aortic dilatation only (n=4, 6%). All patients had MI preoperatively. Twelve patients (18%) had evidence of impaired LVEF (<50%). Six patients (9%) had previously undergone cardiac surgery. Underlying AV pathology included degeneration (n=46; 70%), bicuspid AV (n=8; 12%), Marfan's disease (n=4; 6%), rheumatic (n=5; 8%) and endocarditis (n=2; 3%). Aetiology of MV disease was degenerative (n=33; 50%), rheumatic (n=12; 18%), endocarditis (n=4; 6%), functional (n=10, 15%), ischaemic (n=2, 3%) and other (n=4; 6%). The most frequently performed AV procedures were cusp repair+annuloplasty (n=28, 43%), AV-sparing procedure+cusp repair (n=9, 14%), AV-sparing procedure alone (n=8, 12%) and annuloplasty only (n=8, 12%). Sixteen David (25%) and five Yacoub (8%) procedures were performed. MV procedures included annuloplasty only (n=52, 80%), cusp resection (n=18, 28%) and neochordae formation (n=10, 15%). Concomitant procedures were performed in 21 patients (32%). These included tricuspid annuloplasty (n=10), CABG (n=7), CABG+Dor (n=1), tricuspid annuloplasty+Maze (n=1), Maze (n=1) and left atrial myxoma excision (n=1).

There was one hospital mortality (1.5%). Two patients (3%) required permanent pacemaker insertion while one patient (1.5%) required early AV reoperation. At discharge, no patient had AI >2+ as compared to 30 patients pre-operatively (p<0.001). Peak AV gradient was 13.6±12.4mmHg. At discharge, mean LVEDD was 48±7mm compared to 59±9mm pre-operatively (p<0.007). Mean follow-up was 62±45 months. At latest follow-up 17 patients were NYHA≥2 as compared to 52 patents pre-operatively (p<0.001). At 1, 5 and 10 years, freedom from cardiac death was 100%, 93.4±3.7% and 88.5±5.9%, respectively. There were 8 valve re-interventions and freedom from valve re-interventions at 1, 5 and 10 years was 95.3±2.6%, 91.6±3.6% and 78.4±8.0%, respectively (figure). At 1, 5 and 10 years, freedom from AI 2+ was 98.2±1.7%, 93.4±3.7% and 88.3±5.8% while freedom from MI 2+ was 96.4±2.4%, 93.3±3.8% and 93.3±3.8%. AVr/MVr is safe and has excellent overall survival and freedom from valve-related events up to 10 years post-surgery. This suggests that AVr/MVr is an effective alternative to DVR or AVR plus MVr in patients with concomitant AI and MI. AVr/MVr may also be an attractive option in relatively young patients who wish to avoid warfarin where the rate of structural valve failure would be relatively high. A learning curve exists for AVr/MVr and wider training internationally is, therefore, warranted. Future studies are required to confirm the effectiveness of AVr/MVr against procedures involving valve replacement.



Cardic: Professional Challenges 10:15–11:45 **Room 116/117**

Atrial fibrillation of any kind in patients undergoing coronary artery bypass surgery affects survival-what are the options?

Espen Fengsrud *Sweden*

Atrial fibrillation (AF) is the most common type of arrhythmia among patients undergoing aortocoronary bypass surgery (CABG). Up to 9% of the patients present themselves with preoperative

AF accompanying their coronary artery disease and approximately one-third of CABG patients with preoperative sinus rhythm sustain an episode of postoperative AF.

Atrial fibrillation is associated with a doubled mortality risk and a fivefold increased risk of stroke. In cardiac surgery patients, preoperative AF is an independent risk factor for short- and long-term mortality. More surprisingly, an episode of postoperative AF is also associated with decreased long-term survival, which is mainly explained by an increased risk of cardiovascular death.

The increased morbidity and mortality risk in CABG patients with AF of any kind is a major challenge to our profession.

Dr. Espen Fengsrud is working as an arrhythmia cardiologist at Orebro University Hospital, Sweden, and has together with cardiac surgeon Anders Ahlsson been involved in previous epidemiological studies of AF in cardiac surgery patients.

They have found that an episode of postoperative AF is a risk indicator of future AF and at least 25% of these patients develop AF during six years follow-up. Management of these patients with regard to anticoagulation and anti-arrhythmic medication remains controversial.

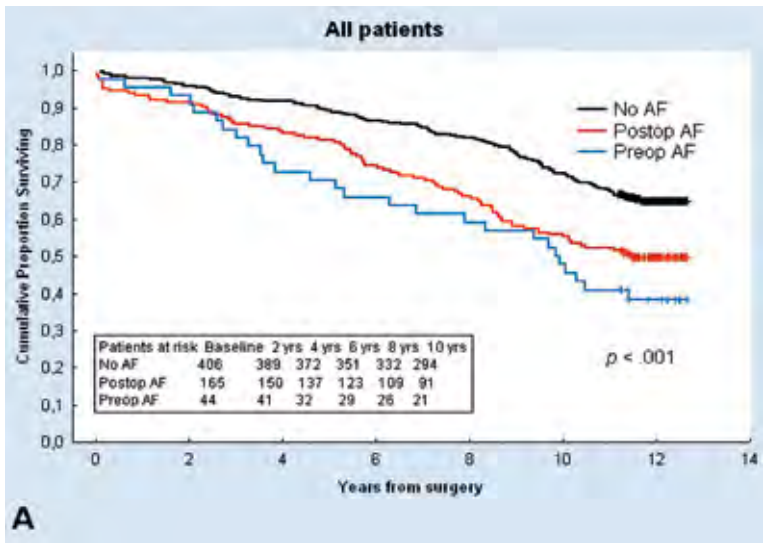


Figure 1: Kaplan-Meier survival curve for all patients with No atrial fibrillation (AF), Preoperative, AF and Postoperative AF undergoing coronary artery bypass graft (CABG) surgery, 1999–2000. Survival curves for all patients. Log rank test p<0.001.

The aim of the present study was to evaluate pre- and postoperative AF as risk factors for long-term mortality among CABG patients. By identifying specific associated risk factors and causes of death in this patient cohort, our intention was to generate further hypotheses which can be evaluated in clinical studies.

Six hundred and fifteen patients undergoing aortocoronary bypass surgery at the Department of Thoracic and Cardiovascular Surgery, Örebro University Hospital, Örebro, Sweden in the years 1999-2000 were studied and causes of death were obtained for deceased patients. The mean follow-up time was twelve years.

The main finding in the study is that pre-or postoperative AF is an independent risk factor for late mortality, and the increased mortality is linked to specific death causes as cerebral ischemic death, sudden death and death due to heart failure.

The specific death causes in both AF groups indicate that AF is the main factor increasing the long-term mortality.

These findings support a better follow-up strategy in patients with postoperative AF, the potential beneficial role of concomitant AF ablation surgery and better compliance to existing guidelines of anticoagulant therapy in patients with preoperative AF.

Cardiac: Abstracts 10:15–11:45 **Room 115**

Left ventricular/ biventricular for assist device support in children

Massimo Padalino
University of Padova, Italy

Our present study is an objective and critical evaluation of our initial experience with VAD therapy, in which we sought to evaluate if a precocious VAD implant (i.e. before MOF occurs) can lead to improvement in clinical outcomes.

Heart transplantation is currently a highly effective therapy for patients with end-stage heart failure. However, due to the limited number of donors, only a small percentage of patients can benefit from this operation,especially in the pediatric age, where mortality rate while awaiting transplantation can exceed 20%. Due to the limited supply of organ donors, long-term support is needed for chronic heart failure. Limited experience is reported among infants and children. We have reviewed our initial experience with Berlin Heart EXCOR ventricular assist device (VAD) in children and adolescents with end-stage heart failure since our very first case in 1996. Starting from 2007, we changed our approach and philosophy of VAD therapy, and we started to evaluate patients for an earlier implant. Thus, we sought to analize our experience before and after this change of VAD therapy management, in order to evaluate appropriateness of surgical indication and clinical management issues, with the final aim of determining institutional guidelines and improving our outcomes.

Between January 1992 and June 2011, 11 patients aged less than 18 years underwent Berlin Heart(BH) implantation in our institution (M/F: 9/2, mean age 4±5 yrs). Indications to VAD implantation were cardiogenic shock in dilated cardiomyopathy (4 patients), congenital heart disease (4 pts), myocarditis (2 patients), and other causes in 1. Six patients required emergency extracorporeal membrane oxygenation before BH implantation. Median BH support was 79 days (range 1 d-9.7 mths). Complications occurred in most patients. Overall survival to discharge was 27%. However, after 2007 results improved substantially, since 60% of patients were successfully bridged to heart transplant. Currently, including patients out of this series, our results are satisfactory, with an 87,5% of successful bridge to transplant. In conclusion, the ventricular assist device therapy with Berlin Heart Excor has proved to be an effective support in end-stage pediatric heart failure used as bridge to transplantation when indication is early. The preoperatory comorbidities may have an important negative impact on early survival, while postoperative signs of inadequate tissue perfusion such as renal and multiorgan failure can predict unsuccessful outcomes for these children. We recommend an early indication to BH implant in order to improve outcome of our pediatric patients.

Continued from page 28

14:30 **Conventional elephant trunk versus frozen elephant trunk technique in the treatment of patients with thoracic aortic disease: effect on neurological complications** *S. Leontyev, M. Borger, C. Etz, M. Moz, J. Seeburger, F. Bakhtiary, M. Misfeld, F. Mohr (Germany)*
Discussant: R. Di Bartolomeo (Bologna)

14:45 **Hybrid repair of mega aortic syndrome with the lupiae technique** *G. Esposito, S. Bichi, D. Patrini, P. Tartara, P. Gerometta, V. Arena (Italy)*
Discussant: M. Grabenwöger (Vienna)

15:00 **Total aortic arch replacement with frozen elephant trunk: 10-year single centre experience** *M. Shrestha, F. Fleissner, F. Ius, M. Karck, A. Martens, M. Pichlmaier, A. Haverich (Germany)*
Discussant: A. Saito (Tokyo)

15:15 **One-stage repair in complex multisegmental thoracic aneurysmal disease: results of a multicentre study** *C. Mestres[1], K. Tsagakis[2], D. Pacini[3], R. Di Bartolomeo[3], M. Grabenwöger[4], M. Borger[2], R. Bonser[5], H. Jakob[2] ([1]Spain, [2]Germany, [3]Italy, [4]Austria, [5]United Kingdom)*
Discussant: S. Numata (Fukui)

15:45 **Coffee**

Abstracts

16:15 **Contemporary approaches in acute and chronic type B aortic dissection**
Room 113
Moderators: A. Martens, Hannover; R. Di Bartolomeo, Bologna

16:15 **Outcome of open surgery for type B aortic dissection** *M. Nozdrzykowski, J. Garbade, C. Etz, M. Misfeld, M. Borger, F. Mohr (Germany)*
Discussant: C. Hagl (Munich)

16:30 **Open aortic repair of distal arch and descending aortic aneurysm: contemporary outcomes in 250 patients** *T. Fujikawa (Japan)*
Discussant: B. Pfannmüller (Leipzig)

16:45 **Clinical outcome of emergency surgery for acute type B aortic dissection with rupture** *T. Minami, K. Imoto, K. Uchida, N. Karube, T. Yasutsune, T. Cho, E. Umeda, M. Masuda (Japan)*
Discussant: W. Schiller (Bonn)

17:00 **Incidence and risk factor analysis of aortic erosion after endovascular thoracic aortic repair for aortic dissection** *K. Shimamura, T. Kuratani, Y. Shirakawa, K. Torikai, J. Yunoki, T. Sakamoto, Y. Watanabe, Y. Sawa (Japan)*
Discussant: S. Folkmann (Vienna)

17:15 **Fate of the distal true lumen after stent-grafting for type IIIb aortic dissection: a word of caution** *F. Dagenais, P. Voisine, S. Mohammadi, E. Dumont (Canada)*
Discussant: W. Morshuis (Nieuwegein)

17:30 **Assessment of duration from onset to thoracic endovascular aortic repair in type B aortic dissection: impact of aortic remodelling as the predictive factor for aortic events** *Y. Watanabe, T. Kuratani, K. Shimamura, Y. Shirakawa, K. Torikai, J. Yunoki, T. Ueno, Y. Sawa (Japan)*
Discussant: K. Tsagakis (Essen)

17:45 **Session ends**

Cardiac: Abstracts 10:15–11:45 Room 120/121

Six-year outcomes following heart transplantation: effect of preservation solution on survival and rejection

Aldo Cannata *Niguarda Ca' Granda Hospital, Milan, Italy*

Many different solutions for organ preservation are routinely adopted in clinical heart transplantation (HT). However, it is still controversial which solution offers the best results in terms of allograft function and patient survival. Moreover, most of studies comparing different preservation solutions focused on in-hospital results, with longest follow-up duration not extending beyond one year after transplantation. We reviewed our experience in HT in order to test the hypothesis if the preservation solution has an effect on patient six-year survival and freedom from rejection. One-hundred sixty patients underwent HT at our hospital from January 2006 to March 2012. They were divided in three groups, according to the solution adopted in the donor: HTK-Custodiol (n=78), Celsior (n=45) and St Thomas (n=37). For each patient solution was chosen according to surgeon preference. The three groups did not differ significantly in terms of pre-operative features. Overall in-hospital mortality was 15% and we did not observe significant differences of mortality between groups (HTK 15.4%, Celsior 11.1%, St Thomas 18.9%, p.61). At six years survival did not differ significantly between the three groups (HTK 76.4%, Celsior 74.3%, St Thomas 73.2%, log rank 0.68). Also freedom from grade <2R rejection was similar between the three groups. However, we observed a significantly higher incidence of grade ≥2R rejection in Celsior group (20.1%) as compared to other solutions (HTK 6.8%, St Thomas 2.7%; log rank.008; Figure 1). Freedom from grade ≥2R rejection remained lower in Celsior group even after splitting the groups according to the occurrence of preoperative and/or postoperative renal failure (log rank.01; Figure 2). The results presented herein confirm the conclusions of an our previous study performed on a smaller subset of transplanted patients, namely that HTK, Celsior and St Thomas solutions do not differ significantly in terms of in-hospital incidence of biventricular failure and death. It should be noted that the lower incidence of biventricular failure and in-hospital death in Celsior group is nonsignificant and it is associated to a lower need of preoperative mechanical circulatory support as compared to other groups.

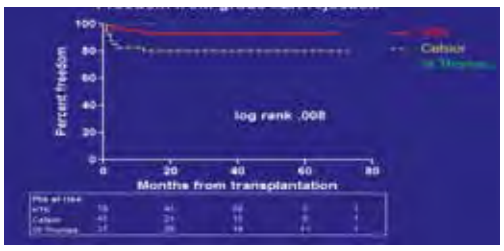


Figure 1: Freedom from grade ≥2R rejection, log rank .008

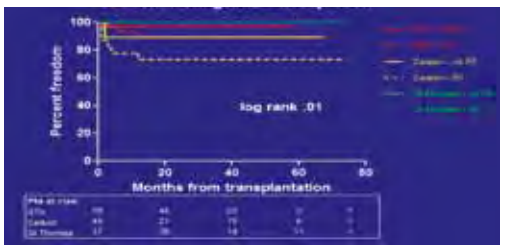


Figure 2: …and log rank .01

Moreover, data from this study showed that preservation solutions did not differ significantly in terms of 6-year survival and early and late graft function. However, freedom from grade ≥2R acute cellular rejection was significantly lower in Celsior group as compared to HTK and St Thomas, even following adjustment for the preoperative or postoperative renal function. The reason of such difference remains still unexplained. It could be related to some component of the solutions, but further investigations are needed to clarify such issue. St Thomas solution showed the highest freedom from grade ≥2R rejection. Moreover, also perioperative release of creatine kinase MB, left ventricular ejection fraction and tricuspid regurgitation did not show significant differences between the three solutions. Satisfactory allograft function has been maintained during follow-up independently from the type of preservation solution.

Vascular: Profeesional Challenges 10:15–11:45 Room 113

Complete arch replacement using branched prosthesis and gradual re-perfusion technique

Paul P. Urbanski
Cardiovascular Clinic Bad Neustadt, Germany

Antegrade cerebral perfusion makes deep hypothermia non-essential for neuroprotection. However, performing distal arch anastomosis and/or anastomoses with supra-aortic arter-ies can be difficult and time consuming in particular arch pathologies. We recommend, for such cases, a technique of gradual reperfusion for shortening both the circulatory arrest and unilateral cerebral perfusion times by using a bifurcated arterial line and a branched prosthesis (Figure1). An arterial line is bifurcated using Y-shaped connectors. The first line is used for cannulation of the right common carotid artery for establishment of cardiopulmo-nary bypass and unilateral cerebral perfusion during the arch replacement. After cross-clamping the supra-aortic arteries, the perfusion of the lower body is interrupted at the rectal temperature of about 30-32°C. The unilateral cerebral perfusion is maintained by simply reducing the flow rate to about 1.5 litres a minute at the blood temperature of 28°C. The aortic arch is resected and the supra-aortic arteries are severed distally from their origins. First, the end-to-end anastomosis between the graft and the descending aorta is performed using a 5-0 suture and then one of the four side-branches is cannulated with the second branch of the arterial line. After clamping remaining side-grafts, perfusion of the lower body is reestablished. For perfusion of the bifurcated line, separate pumps are not necessary because the

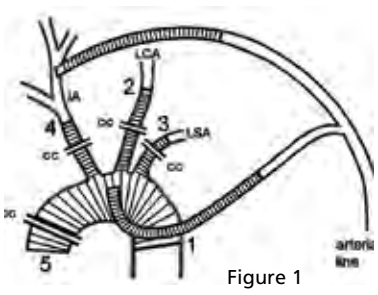
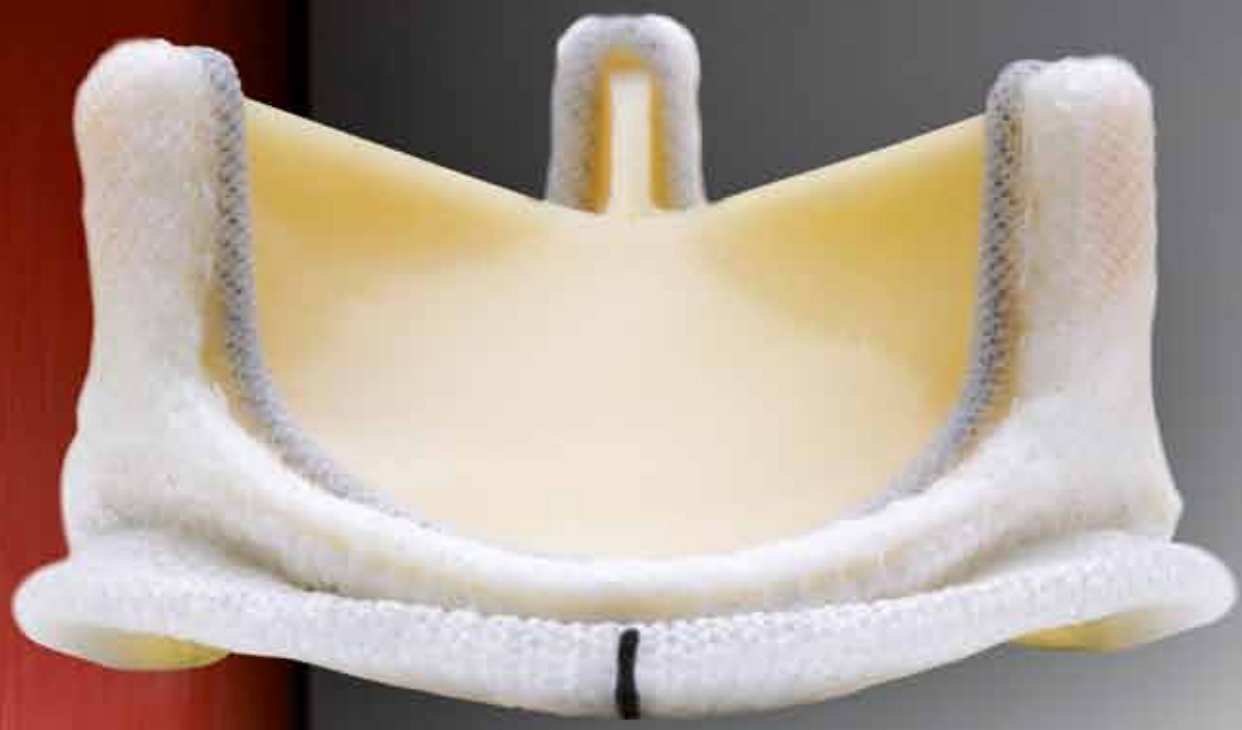


Figure 1

peripheral resistance is much lower in the aorta, and the flow rates are distributed automatically. Then, the side branches of the graft are anastomosed to the arch vessels. The numbers in Figure1 indicate the sequence of anastomoses. Cere-bral perfusion is re-established, step-by-step after completing each further anastomosis, starting with the left carotid artery or with the left subclavian artery when the latter is locat-ed very deeply in the chest. Consequently, cerebral perfusion is re-established gradually ensuring shortening of unilateral cerebral perfusion. In comparison to a re-routing of the supra-aortic arteries and implantation of the endograft, only one additional anastomosis, namely the distal one, had to be performed; however, conventional surgery offers anatom-ical and definitive repair while avoiding the side-clamping of the ascending aorta and risk of cerebral embolism.

The technique presented is very suitable for aortic arch surgery. It offers avoidance of deep hypothermia with all its negative side effects and shortening of the cardiopulmonary bypass time, even in cases of complex arch repair for which prolonged time of surgery is necessary. It also enables complete arch replacement without a considerably longer time of lower body ischemia in situations when elective hemiarch replacement was planned and an unexpected situation (e.g., severe ulcerous or exophytic atherosclerosis changes within the aortic arch) demands an extension of repair.

LEADING VALVE REPLACEMENT TECHNOLOGY



CARPENTIER-EDWARDS PERIMOUNT MAGNA EASE PERICARDIAL AORTIC BIOPROSTHESIS

Progress Confidently

For professional use. See instructions for use for full prescribing information, including indications, contraindications, warnings, precautions, and adverse events.

Edwards Lifesciences devices placed on the European market meeting the essential requirements referred to in Article 3 of the Medical Device Directive 93/42/ECC bear the CE marking of conformity.

Edwards Lifesciences
Irvine, USA | Nyon, Switzerland | Tokyo, Japan | Singapore, Singapore | São Paulo, Brazil

Edwards

Cardiac: Abstracts 10:15–11:45 **Room 112**

Effect of annulus dimension and annuloplasty in bicuspid aortic valve repair

Emiliano Navarra *Institute*

Bicuspid aortic valve (BAV) repair for aortic regurgitation (AR) and or aortic aneurysm is an attractive alternative to prosthetic valve replacement in the adolescent and young adult. However, most studies report a reoperation rate of 20% or more after one decade mainly due to recurrence of AR. We have recently shown that valve sparing reimplantation (VSR) improves durability of BAV repair in comparison to subcommissural annuloplasty (SCA). The aim of this study was to assess the degree of annular reduction provided by these techniques and correlate that with repair durability. From 1995 to 2010, 161 patients underwent BAV repair. For this study, we included only the patients with SCA or VSR having intra-operative pre- and post-repair trans-esophageal echocardiography stored in our echocardiographic images database. Pre- and post-repair VAJ diameter was measured on the long axis views. Inclusion criteria were met by 53 patients with SCA and 65 patients with VSR. Median follow-up was 42 months. Follow-up was 100% complete in SCA group and 94% complete in VSR group.

There was no operative or late mortality in this population of patients. Mean pre-operative VAJ was similar in both groups (VSR: 28.3 ± 3.5mm vs SCA: 27.5 ± 3.3, p= 0.16). Preoperative VAJ was larger in patients <40 years and in patient with aortic regurgitation (AR) ≥ 3+ (p<0.001). Mean post-operative VAJ was smaller in VSR in comparison to SCA (21.4 ± 0.22mm vs 23.6 ± 0.36mm, p<0.001).

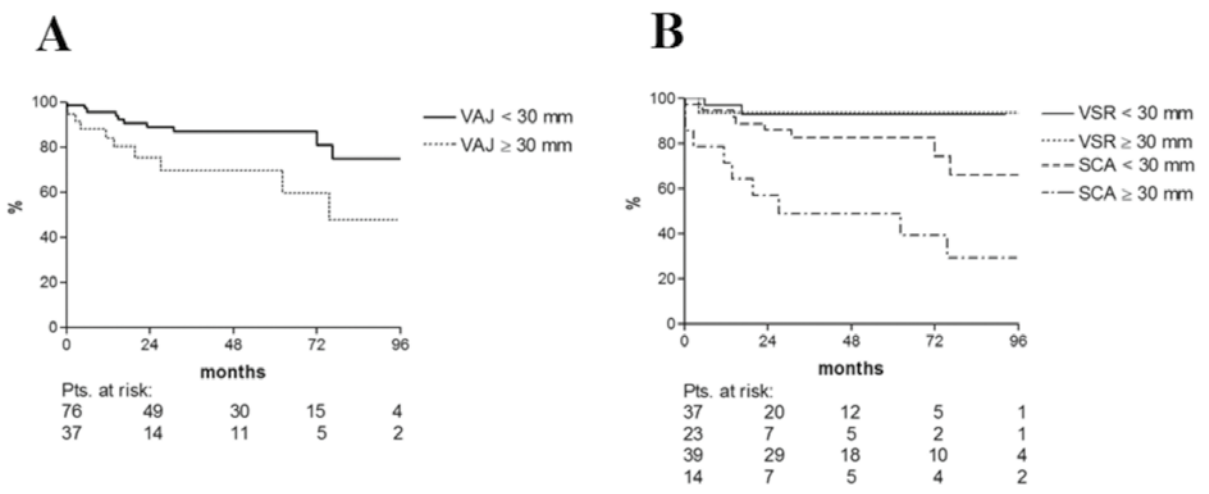


Figure 1: A. Kaplan-Meier actuarial survival curves comparing freedom from recurrent aortic regurgitation >1+ on basis of preoperative ventriculoaortic junction (VAJ) diameter ≥30mm in the entire cohort (p=0.03). B. Idem a. in subcommissuralannuloplasty (SCA) and valve sparing reimplantion (VSR) groups (SCA <30mm vs SCA ≥30mm, p= 0.01; VSR <30mm vs VSR ≥30mm, p= 0.93; SCA ≥30mm vsVSR ≥30mm, p= 0.01; SCA <30mm vsVSR <30mm, p= 0.16).

In univariate analyzes, SCA, preoperative VAJ ≥30mm, postoperative VAJ ≥25mm and pericardial patch for cusp repair were predictive of recurrent AR >1+. In the SCA group, preoperative VAJ ≥30mm and postoperative VAJ ≥25mm were associated with decreased 6 years freedom from recurrent AR >1+ (<30mm: 74.4% vs ≥30mm: 39.2%, p= 0.01; <25mm: 80.1% vs ≥25mm 30.8%, p= 0.002) In the VSR group, preoperative VAJ ≥30mm had no effect on recurrent AR >1+ (<30mm: 92.8% vs ≥30mm: 93.8%, p=0.93) and postoperative VAJ ≥25mm was observed in only three patients having VSR. In conclusion, in BAV repair, the circumferential annuloplasty provided by VSR offers greater reduction of the VAJ compared to the non-circumferential annuloplasty provided by the SCA. The degree and extend of VAJ reduction in the VSR seems to be one factors among others that positively influence the repair durability especially in patient with large VAJ (≥30mm).

Cardiac: Abstracts 10:15–11:45 **Room 120/121**

Evaluation of cardiac grafts from non-heart-beating donors: hemodynamic and biochemical measures at procurement predict contractile recovery

Monika Dornbierer, Joevin Sourdon, Simon Huber, Brigitta Gahl, Thierry Carrel, Hendrik Tevaearai, Sarah Longnus *Department of Cardiovascular Surgery, Inselspital, Berne University Hospital and University of Berne, Switzerland*

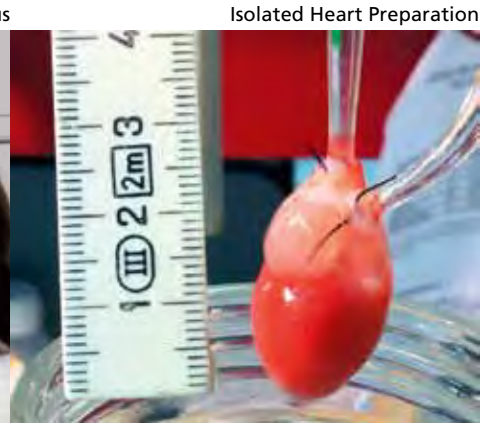
Heart failure is a progressive disease and counts among the leading causes of morbidity and mortality in western countries. In the most advanced stage, cardiac transplantation remains the only reasonable possibility for improving quality of life and survival. Unfortunately, this life-saving therapy is available to only a fraction of those who need it because of the constant shortage of available donors.

Non-heart-beating donors (NHBDs) represent a currently untapped source of hearts that could significantly increase donor availability. Although the first human cardiac transplantations were performed with these donors, NHBD cardiac donation was rapidly abandoned with the subsequent definition of brain death. More recently, however, one clinical report described three successful pediatric heart transplantations with NHBD hearts, providing new evidence to support this approach[1]. Notably, it has been estimated that the pool of cardiac grafts could increase by 17% for adults and 42% for children, if use of NHBDs were to become widespread[2,3].

Despite the considerable potential of NHDBs, this donor population has not been adopted for heart transplantation, mainly because of concerns regarding damage sustained as a result of the unavoidable period of warm ischemia. Importantly, several pre-clinical reports have provided evidence that hearts do tolerate warm ischemia, if limited to a period of 20-30 min, and may thus maintain sufficient integrity for transplantation[4–7]. From a clinical perspective, however, using an ischemic heart remains questionable, especially as recognized means to predict the recovery of freshly explanted hearts are not currently available.

Monika Dornbierer (left) and Sarah Longnus

Isolated Heart Preparation



We have investigated means to evaluate cardiac graft suitability for transplantation using an isolated, working, NHBD rat heart model. To do so, we assessed the potential of several parameters measured immediately after a period of warm, in situ ischemia, at the time of heart procurement, to effectively predict contractile recovery following subsequent cardioplegic storage and reperfusion.

We demonstrate that several hemodynamic and biochemical parameters, assessed during a brief, unloaded perfusion at procurement, are highly correlated with contractile recovery following cardioplegia and reperfusion. Although our experience is limited to small animal model, we believe that this approach may be of clinical relevance, especially in the setting of cardiac transplantation with NHBDs, to aid in the development of protocols for evaluating cardiac graft suitability for transplantation at the time of organ procurement.

More detailed results will be presented this week by Ms Dornbierer.

References

1. Boucekmm, et al. N Engl J Med 2008;359: 709-714.
2. Osaki S, et al. Eur J Cardiothorac Surg 2010;37(1):74-9.
3. Koogler T, et al. Pediatrics 1998;101(6):1049-52.
4. Illes RW, et al. J Heart Lung Transplant 1995;14:553-61.
5. Koike N, et al. Transplantation 2004;77:286-92.
6. Scheule AM, et al. J Invest Surg 2002;15:125-35.
7. Koike N, et al. J Heart Lung Transplant 2003;22:810-7.

Cardiac: Focus Session 10:15–11:45 **Room 122/123**

An alternative access approach

Pierre-Yves Etienne
Brussels, Belgium

Transcatheter aortic valve implantation is a rapidly growing technology with continuous new developments. In the Partner study, survival advantages have been shown for transfemoral approach in inoperable patients but in high risk patients, results of surgical approach are balanced by deleterious effects of preoperative risk factors of the patients, complications directly associated to the technique including stroke and paravalvular leak but also by specific events related to the transapical route. Trans-Aortic appproach offers to the surgeons new perspectives thanks to a well-known access to the ascending aorta and a simplified approach to the aortic valve. Easiness of the procedure, perfect stability of the delivery system allowed by the proximity to the aortic annulus, and prompt access to conventional surgical procedure could offer additional advantages when compared to other access routes. Anti-embolic device deployment in the ascending aorta could also lower the rate of neurological complication during the procedure.

Anyway, this approach has until now be performed through upper sternotomy or second intercostal space thoracotomy associated in some cases with partial rib resection.

We present in this meeting the first case of pure totally percutaneous video-assisted thoracoscopic deployment of a Sapien valve through the trans-Aortic route. The intervention was technically uneventfull and the patient was immediately extubated after the procedure. This technique could minimize the side effects of the surgical approach in some selected cases. The efforts of the industry to develop new access closure devices for the ascending aorta and anti-embolic devices could even in the future really simplify the procedure and increase his safety.

Cardiac: Abstracts 10:15–11:45 **Room 118/119**

Circulatory support in elderly chronic heart failure patients using Circulite's SYNERGY circulatory support system

Alessandro Barbone
Istituto Clinico Humanitas Rozzano, Italy


Alessandro Barbone

In Chronic heart failure, despite many patients might not benefit from interventions like cardiac resynchronization with pacemakers and defibrillators, yet heart transplantation is available to only a limited number of patients per year. The CircuLite SYNERGY Circulatory Support System, which recently received CE Mark approval in Europe, is a miniature mechanical circulatory support system that represents a new option for the early treatment of ambulatory heart failure. Despite its small size, the SYNERGY Micro-Pump (Figure 1) is capable of providing up to 4.25 L/min of blood flow and is intended for treatment of patients with significantly compromised left heart function. Candidates for SYNERGY therapy are typically classified as INTERMACS 4-6 (i.e., non-inotrope dependent) and are ambulatory but experience relatively frequent hospitalizations for heart failure decompensation. (See Figure 1)

In the current paradigm, mechanical circulatory support systems have largely been limited to treating end-stage heart failure patients due to the highly invasive nature of the implantation procedure and associated complications.

The SYNERGY System (Figure 2) is comprised of CircuLite's proprietary micro-pump, inflow cannula and outflow graft, a percutaneous lead that is connected to a wearable external controller and a lightweight, rechargeable dual battery pack system. The SYNERGY micro-pump is implanted in a subclavicular pocket without the use of cardiopulmonary bypass, and preliminary data from an ongoing study in EU suggest that it is associated with fewer perioperative adverse events than current full support devices.

In 2007, CircuLite initiated a multi-center clinical trial in Europe to evaluated safety and patient quality of life improvements associated with device support. Data from the European trial have shown that supplemental circulatory support with SYNERGY can provide statistically significant, sustained improvements in hemodynamics and a reduction of symptoms of heart failure.

In a sub-analysis, CircuLite investigators compared safety and efficacy data in younger (<70 years) versus older (≥70 years) patients. The initial experience has suggested that the minimal invasive implant procedure might be well tolerated by older and more fragile patients; specifically, more tolerable than a full sternotomy on cardiopulmonary bypass procedure.

Clinically, older patients have certain characteristics that differ from the younger patients: they have longer history of heart failure, are not eligible for transplant, and thus have already undergone more intensive efforts to exhaust all conventional therapies. Furthermore elderly patients tend to recover and rehabilitate more slowly from surgery, are more prone to infection and other complications. Bleeding might be an issue due to particular tissue frailty of the elderly patient.

Despite its limited experience for this class of patient, the lesser invasive nature of this system (small size, no sternotomy, and no cardiopulmonary bypass) can be considered to be associated with less adverse events in the short- and long term, especially in the more fragile patients. This strategy may be particularly useful in elderly patients less likely to be able to tolerate more invasive procedures.

For additional information about CircuLite or to see the SYNERGY System, please visit EACTS booth 4 or visit www.CircuLite.net.

Figure 1: CircuLite SYNERGY Micro-Pump


Figure 2: SYNERGY System

Cardiac: Professional Challenges 10:15–11:45 **Room 116/117**

Should moderate ischaemic mitral regurgitation be corrected at the time of coronary artery bypass grafting? answer from a 10-year follow-up

Vadim Shumavets, Alexander Shket, Andrey Janushko, Svetlana Kurganovich, Irina Grinchuk, Natalia Semenova, Oksana Jdanovich, Youry Ostrovski *Belarus Cardiology Centre*


Vadim Shumavets

Ischemic functional mitral regurgitation (IMR) develops in 20-25% of patients after myocardial infarction and is strongly associated with poor outcomes in patients with advanced coronary artery disease. However, the evidence to support mitral valve surgery at the time of CABG in the presence of moderate mitral regurgitation is still weak. Even in recently published by ESC and EACTS the European Guidelines on the management of valvular heart disease (version 2012) declared that there is continuing debate regarding the management of moderate IMR in patients undergoing CABG.

Whether correcting of mitral regurgitation at the time of coronary artery surgery improves long-term survival and functional class was the aim of our study.

A total of 1,296 patients from prospectively maintained clinical all-in-comers database presenting moderate to severe ischemic MR were therefore studied, treated either by isolated CABG (n=509) or combined CABG+mitral valve (MV) repair (n=787). We focused our interest on more than five-years long-term survival (n=541) with mean follow-up 5.2±1.84 years (range, 0–11.4 years). Using propensity score matching in an attempt to control the selection bias, we was able to overcome initial heterogeneity of our study group and received an absolutely homogenous cohort of 190 patients with moderate MR, moderate LV dilatation and moderate LV depression, excepting difference in surgical management on MV. 10% of survivors were followed more than nine years. We considered estimates of outcome reliable to 10 years.

Key findings of our study were that: 1) CABG+MVR significantly reduced MR compare to CABG alone, but even after isolated myocardial revascularization MR grade decreased in 49.2% of patients; 2) addition of MV annuloplasty to CABG considerably improved symptoms during follow-up, but the percentage of severe symptomatic patients remains at high level (30.6 – 41.2%); 3) addition of MV annuloplasty to CABG had no evident survival benefit in homogenous propensity-matched cohort of patients with moderate MR and moderate LV dysfunction over 10-years follow-up (HR (95%CI) 1.07; 0.54-2.1; p – 0.82). ; 4) risk factors based on multivariate Cox's regression analyses for late survival of these ischemic patients with moderate IMR and moderate enlarged LV was mostly based on the presence of severely depressed LV function (LVEF < 40% HR 1.91; p – 0.025),, LV dilation (EDD HR 1.05; p – 0.027), age and additive sum of Euroscore I, also assessed the non-cardiac comorbidities.

We were enable to assess does recurrent MR directly affect survival due to incompleteness of Echo follow-up to date. But the end points of this study were very strong predictors of death during long-term follow-up and we not found any significant difference between groups in entire unadjusted cohort in terms of all another component of MACE.

In conclusion, the present study demonstrates that the fact of performing MV procedure during CABG significantly reduced MR grade but seems did not improve the late survival. Moderate IMR decreased after successful revascularization alone in near half of patients and we as cardiac surgeons are required to provide full revascularization to our CABG+IMR patients. Our date still emphasizes the importance of left ventricle in resolving problem of ischemic mitral regurgitation.

Figure 1

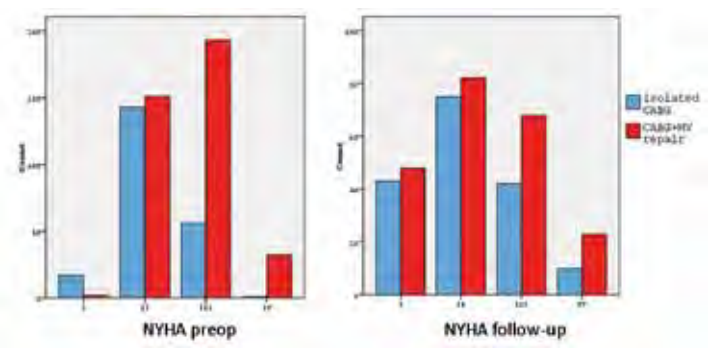
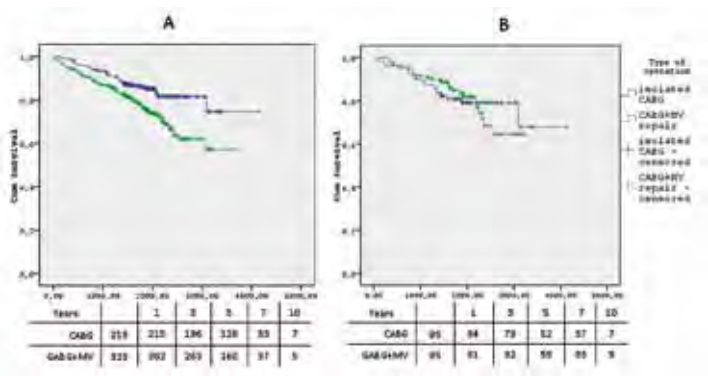


Figure 2



Thoracic: Abstracts 10:15–11:45 **Room 133/134**

Pneumonectomy with en bloc chest wall resection: is it worthwhile? report on 34 patients from two institutions

Giuseppe Cardillo *Carlo Forlanini Hospital, Rome, Italy*

I am very proud to present this study "Pneumonectomy with en-bloc chest wall resection : is it worthwhile? report on 34 patients from two institutions "coming from two high-volume Italian institutions, the azienda ospedaliera san camillo forlanini in Rome and the European Institute of Oncology in Milan., addressing the problem of pneumonectomy with en-bloc chest wall resection, a procedure which is often denied because of the procedure-related high-risk.

As far as I know this represents a unique study on such topics. The short and long-term outcome of this procedure were carefully evaluated.

From 1/1995 to 10/2011, 34 patients (30 male, four female; mean age: 61.8 yrs) underwent pneumonectomy with en-bloc chest wall resection for 33 NSCLC and one metastatic osteosarcoma in two institutions. Data were retrospectively reviewed.

The Operative (30-days) mortality was 2.94% (1/34). Morbidity was 38.23% (13/34). There were 14 (41.17%) right side procedures and 20 (58.82%) left side procedures. Three patients (8.82%) developed bronchopleural fistulas. The mean number of resected ribs per patient was 2.7. In 13 patients (38.23%) a prosthetic reconstruction of the chest wall was needed. In three cases (8.82%) the bronchial step was buttressed. Preoperative pain was statistically significantly related to the depth of chest wall invasion (p: 0.026). The N status was N0 in 18 cases (52.94%), N1 in ninw cases (26.47%), N2 in 6 cases (17.64%), and Nx in one case (metastatic osteosarcoma). Patients were followed-up for a total of 979 months. The median survival was 40 months. The overall five-year survival was 46.87%: 45.27% for right and 48.46% for left procedures respectively. According to N status, five-year survival was 59.76 in N0, 55.56% in N1, and 16.67% in N2. The subgroup N0 plus N1 (27 pts) showed a 58.08% five-year survival compared to 16.67% in N2 (Chi-Square 3.74; p: 0.05).

In conclusion, Pneumonectomy with en-bloc chest wall reconstruction can be safely offered to selected patients. The addition of en bloc chest wall resection to Pneumonectomy does not significantly affect operative mortality and morbidity compared to standard pneumonectomy.

The pivotal additional effect of the chest wall resection should not be considered a contraindication for such procedure. Survival is related to nodal status with histologically proven N2 disease to be the single negative prognostic factor.


Giuseppe Cardillo

Cardiac: Abstracts 10:15–11:45 **Room 112**

Functional aortic annulus remodelling using a handmade prosthetic ring improves outcomes in aortic valve repair.

Fattouch K[1], Castrovinci S[2], Murana G[2], Nasso G[3], Guccione F[1], Dioguardi P[1], Bianco G[1], Ballo E[1], Speziale G[3] *1 Department of Cardiovascular Surgery, GVM Care and Research, Maria Eleonora Hospital, Palermo, Italy; 2 Department of Cardiac Surgery, University of Palermo, Palermo, Italy; 3 Department of Cardiovascular Surgery, GVM Care and Research, Anthea Hospital, Bari,Italy*

The normal function and competency of the aortic valve depend on the integrity of all structural aortic root components: the aortic valve, the nadir of the annulus, the sinuses of Valsalva, the sino-tubular junction and the tubular part of ascending aorta. The functional aortic valve annulus (FAVA) is a complex unit with proximal (aorto-ventricular junction) and distal (sino-tubular junction) components. These two anatomical structures, apparently separate, are strictly in contact by the commissures. So, any pathology affect each of aortic root components may lead to aortic valve dysfunction and insufficiency. Understanding the mechanisms of aortic valve dysfunction and the etiology of lesions has deeply aided surgeons in techniques advance to repair the aortic valve and root and to avoid valve replacement. Aim of our study was to evaluate the impact of the total FAVA remodeling, using a new handmade prosthetic ring (Figure.1), on long term results after aortic valve repair (AVR).

Since February 2003, 250 patients with tricuspid aortic valve regurgitation (AR) underwent AVR in our institutions. The mechanisms of valve dysfunction according to functional classification were the following: Type I in 79 (31.6%) patients, Type II in 138 (55.2%) and Type III in 33 (13.2%). Concomitant aortic root or ascending aorta replacement were performed in 166 patients (66.4%). FAVA dilatation was corrected by our ring in 42 patients, subcommissural plasty in 77, subcommissural plasty plus ascending aortic replacement in 57, David's procedure in 89. Leaflet prolapse was corrected in each patients. The mean follow-up was 48±14 months. Long-term survival and freedom from recurrent AR ≥ moderate

Khalil Fattouch

was evaluated by Kaplan-Meier.

There was 6 (2.4%) in-hospital deaths. A second pump-run was required in 14 (5.6%) patients to correct residual AR. Mechanisms of residual AR were uncorrected cusp prolapse in nine patients and residual annulus dilatation in five. Overall late survival was 90.4%. Late cardiac-related deaths occurred in 15 patients. At follow-up, 36(16%) patients had recurrent AR ≥ than moderate (cusp re-prolapse and/or FAVA dilatation). FAVA dilatation occurred only in isolated AVR with or without ascending aortic replacement. Freedom from recurrent AR was significantly higher for AVR plus David's procedure or FAVA remodeling by prosthetic ring compared with isolated AVR (p<0.01) or AVR plus ascending aorta replacement (p=0.02). There wasn't statistical difference between David's procedure or prosthetic ring annuloplasty (p=0.26).

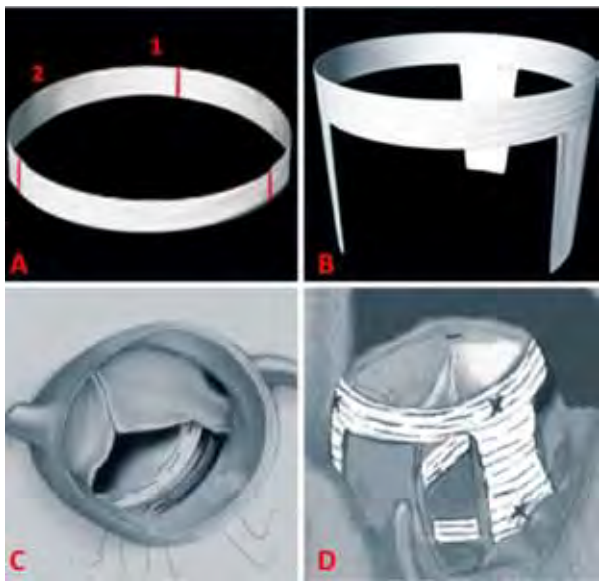


Fig 1.(A) Circular ring for subvalvular aortic annuloplasty: (1) the commissural zone and (2) the intercommissural zone. (B) The three crown-like shaped ring for the sinotubular junction annuloplasty. (C) The circular ring is sutured into the left ventricular outflow tract just under the aortic valve cusps. (D) The sinotubular junction ring is sutured from outside the ascending aorta at the level of the sinotubular junction. The three vertical arms of the sinotubular junction ring were fixed to the underlying circular ring to stabilize the continuity between the two structures and to reshape the functional annulus.

In conclusion, FAVA annuloplasty by our prosthetic ring is a safe and good procedure for treatment of AR and FAVA long term stabilization. This technique may be used in all patients with slight root dilatation to avoid aggressive root reimplantation. We recommended total FAVA annuloplasty in all patients underwent AVR to improve long term repair results.

Cardiac: Abstracts 10:15–11:45 **Room 114**

Mitraclip therapy in heart failure patients with functional Mitral Regurgitation

Single centre experience in 85 consecutive high-risk patients with severe systolic dysfunction

Maurizio Taramasso
Cardiac Surgery Department,
San Raffaele Scientific Institute, Milan, Italy

Perioperative mortality after surgery for functional mitral regurgitation (FMR) is not negligible and a large number of patients with FMR is not referred for open heart surgery because of high surgical risk or comorbidities. New percutaneous techniques have been recently developed to treat MR with less invasive approaches. The MitraClip TM (Abbott Vascular Inc. Menlo Park, CA, USA) is a device reproducing the Alfieri surgical technique with a percutaneous approach which has been used to decrease the invasiveness for the high risk patients to treat both degenerative and functional MR. The aim of this study is to report the clinical outcomes of MitraClip therapy to treat symptomatic high-risk patients with severe FMR and severe LV dysfunction in our single centre experience.

From October 2008, 85 consecutive high-risk patients with FMR underwent MitraClip implantation (mean age 68±9.5 years). FMR was ischemic in 55pts (73%); 78.8% pts were in NYHA class III-IV, while average Logistic EuroScore was 21.8±16%, with about 50% of the patients having Logistic EuroScore≥20%.

Preoperative echo parameters included: EF 27±9.8% and LVEDD 69.8±7.8mm. Quality of life questionnaire revealed an important impairment in perceived quality of life in all the patients.

In-hospital mortality was 1.1%. Globally, 60% of the patients had an intensive care unit stay less than 24 hours. Median postoperative length-of-stay was 4.8 days The majority of the in-hospital survivors was discharged home (67.8% of the total). Predischarge echocardiography showed residual MR≤2+ in 87% of the patients.

Overall actuarial survival was 87.7±4.1 at one-year. Actuarial freedom from MR≥3+ was 79.3±5.3% at one-year. At one-year follow-up, a significant improvement in EF was documented (from 27±9.8% to 34.7±10.4% -p=0.003) and 86% of the patients were in NYHA class I-II. A significant improvement was documented with all the quality of life assessments.

The results of the present study confirm safety of MitraClip therapy in end-stage patients with FMR who are not amenable for surgery, suggesting that in presence of extremely high surgical risk a less invasive approach, like MitraClip therapy, should be considered. MitraClip therapy was associated with low hospital mortality, short postoperative LOS and the postoperative course was smooth in the majority of the patients, in spite of the high-risk profile at baseline.

Mid-term follow-up confirmed the clinical benefit of MitraClip therapy in this setting: 86% of the patients were in NYHA class I-II and a significant improvement in perceived quality of life and functional capacity was documented.

Predictor of mortality at one-year follow-up in our experience were preoperative Logistic EuroScore≥20% (Figure 1), need for postoperative IABP and occurrence of new onset acute renal failure (Figure 2). However, longer follow-up would be required to determine the clinical impact of residual MR after Mitraclip implantation.

In conclusions, this study shows that MitraClip therapy in selected high risk patients with FMR is a safe procedure and can be accomplished with low morbidity and mortality. Moreover, MitraClip treatment is associated to functional status and quality of life improvements at one-year and to significant LV reverse remodelling.

Figure 1

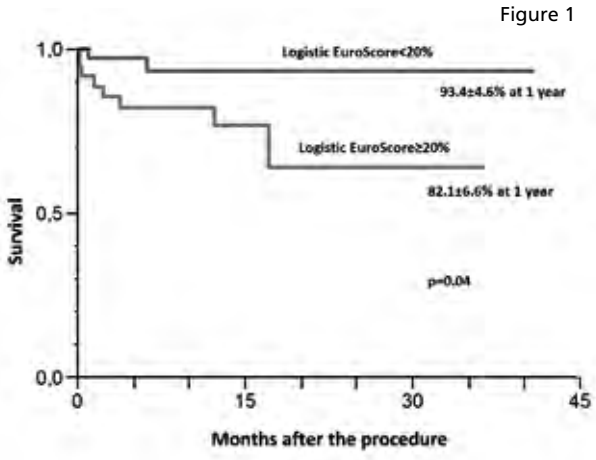
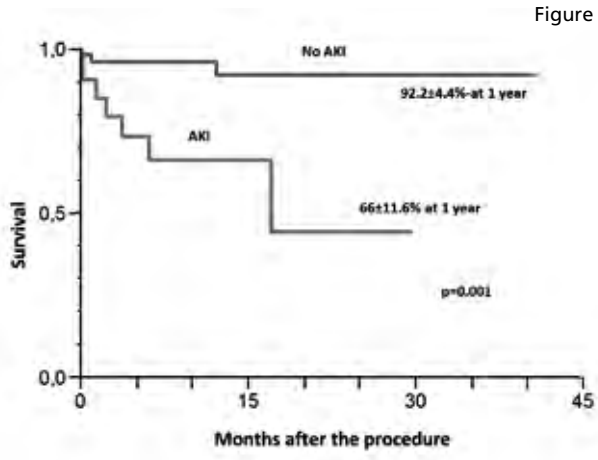


Figure 2



Vascular: Professional Challenges
10:15–11:45 **Room 113**

Frozen elephant trunk

Gabriel Weiss *Vienna, Austria*

The frozen elephant trunk technique is a single-stage hybrid procedure, which enables simultaneous treatment of the ascending aorta, the aortic arch and the descending aorta. The main indications for the frozen elephant trunk repair are aortic dissections type A (DeBakey type I), or aneurysms involving the aortic arch and descending aorta. In case of complicated aortic dissection type B, not amenable for endovascular therapy, the frozen elephant trunk technique seems to offer a valid treatment strategy for dealing these life-threatening aortic pathologies.

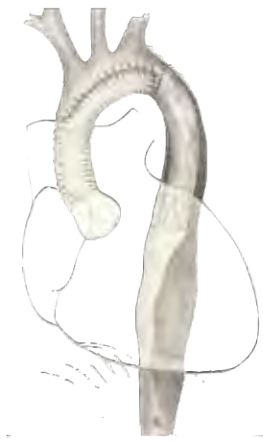


Figure 1

Prosthesis.

The most frequently used prosthesis is the Jotec E-vita open hybrid graft (Hechingen, Germany). It's available in various sizes and lengths and it consists of a polyester graft encapsulating circumferential Z-shaped nitinol stents along its length and a woven polyester graft at the proximal end. Another commercially available hybrid prosthesis is manufactured by Vascutec, Scotland.

Surgical technique.

The surgical access is a complete median sternotomy. In our department we mainly use the right axillary artery for the arterial line of the cardiopulmonary bypass (CPB). Once the extra corporal circulation is established the cooling process is initiated. The reconstruction of the aortic arch can be performed in deep or moderate hypothermic arrest. Depending on the extent of the aortic pathology and the expected circulatory arrest time it is safe to perform the procedure in moderate hypothermia with a core temperature (bladder or rectal) of 26-28° Celsius. For brain protection we use selective antegrade bilateral cerebral perfusion (10ml/kg bodyweight). The left subclavian artery is typically blocked with a 6-F Fogarty catheter to prevent a steal phenomenon. After resection of the diseased aortic tissue the hybrid prosthesis is placed into the descending aorta in an antegrade manner through the open aortic arch. In case of aortic dissection, it is recommended to use a guide wire for this maneuver to prevent accidental false lumen intubation. The stent graft is then deployed in the descending aorta with the proximal stent level approximately 2cm distal the offspring of left subclavian artery. The replacement of the aortic arch can be done with the integrated tubular graft of the hybrid prosthesis or with a separate vascular graft. Head vessel re-implantation is then performed according to anatomy and surgeon preference. If anatomically possible we prefer to maintain a 2-3cm junction between the left subclavian artery and the descending aorta. (Fig.1) The Dacron of the hybrid prosthesis is trimmed to a 1cm rim and fixed to the wall of the proximal descending aorta with a 4-0 prolene running suture. Once the arch replacement is accomplished, the graft prosthesis is clamped, and full perfusion and rewarming is restarted. In the rewarming period the proximal anastomosis is completed and concomitant procedures can be performed if necessary.

This single stage hybrid approach enables simultaneous treatment of the ascending aorta, the aortic arch and the descending aorta in order to reduce the necessity for additional operations on the descending aorta and to improve long-term survival. However, if an additional intervention should be necessary, the stent graft of the hybrid prosthesis offers a good landing zone for a secondary TEVAR procedure or even for an open thoraco abdmoninal repair.

Cardiac: Professional Challenges 10:15–11:45 **Room 116/117**

Readmission to intensive care unit as predictor of impaired outcome in times of minimally invasive cardiac surgery

Udo Boeken
Heinrich Heine University, Dusseldorf, Germany

It is well known that patients who suffer from readmission to intensive care unit (ICU) after cardiac surgery face an increased risk of morbidity and mortality. It was our aim to analyse the impact of recent operative strategies on the incidence of readmission. It should be evaluated whether less invasive procedures (i.e. MIC, OPCAB) may be associated with a reduction of this economically important problem. The role of the quantity of ICU-beds as well as the proportion of ICU- to intermediate-care-beds should also be investigated.

Altogether, we reviewed 5,333 patients undergoing cardiac surgery in our department between 2005 and 2010. The incidence and reasons of readmission were determined with regard to individual subgroups, particularly comparing minimally invasive procedures with conventional strategies. We tried to find out perioperative risk factors for morbidity and analysed the impact of the total amount of ICU- and intermediate-care-beds on the rate of readmissions in different time intervals.

In the group of 5,333 patients between 2005 and 2010, there were 5132 patients which could be primarily discharged from ICU. Out of this group, 293 patients needed at least one additional ICU-stay after required readmission (5.7%, group re). According to that, group co consisted of 4839 patients. After readmission, the mean length of stay in hospital was 21.9 ± 11.3 days compared to 12.8 ± 5.0 days in all other patients ($p < 0.05$).

Comparing the readmission rate in separate years, it is obvious that this rate decreases with a growing capacity of ICU and intermediate-care wards.

In patients with less invasive cardiac surgery (i.e. MIC, OPCAB), the readmission rates were significantly lower than in the total of patients. There were also remarkable differences regarding the reasons for readmission, amongst others significantly respiratory problems after minimally invasive procedures.

Readmission to ICU after cardiac surgery is correlated to an impaired outcome. Growing resources with regard to ICU- and intermediate care-capacity may positively influence this problem resulting in a decreasing number of readmissions. Recent surgical strategies with less invasive procedures could also be associated with a reduced incidence of readmission based on less respiratory problems.

Thoracic: Abstracts 10:15–11:45 **Room 133/134**

Bronchoplastic resection without pulmonary resection for endobronchial carcinoid tumours

Kai Nowak[1,3], Wolfram Karenovics[1], Andrew G. Nicholson[2], Simon Jordan[1], Michael Dusmet[1]
1 Department of Thoracic Surgery, Royal Brompton Hospital, London, UK; 2 Department of Pathology, Royal Brompton Hospital, London, UK; 3 Division of Surgical Oncology and Thoracic Surgery, Mannheim University Medical Center, University of Heidelberg, Germany

Bronchial carcinoids are rare neuroendocrine tumours, accounting for less than 5% of all bronchopulmonary tumours. They are categorized as either typical or atypical and have distinctly different prognoses and therapeutic options. Roughly 20% of all carcinoid tumours present as purely intraluminal polyp-like bronchial lesions without gross radiological detectable involvement of the bronchial wall and lung. Until recently, the treatment of choice remained bronchoplastic surgery. However, some authors have described their experience using different endoscopic techniques such as Nd-YAG laser, diathermy and cryosurgery. It is a matter of discussion whether it is necessary to provide some additional local therapy beyond simple excision of the airway component in order to decrease the risk of local recurrence. Long-term follow-up data for both approaches is scant.

We present our experience with all patients with purely endobronchial carcinoids who underwent parenchyma sparing bronchoplastic resection with systematic nodal dissection over the last 10 years and generated a review of literature.

Thirteen patients (age 45±16 years, 10 male) underwent bronchoplastic resection with systematic nodal dissection for endobronchial carcinoid tumours. No lymph node invasion was observed. There was no significant operative morbidity or mortality. Median follow-up was 6.3 ± 3.3 years. One lesion was an atypical carcinoid and at five years a tiny endobronchial tumourlet was seen in the contralateral airway, which was resected endoscopically.

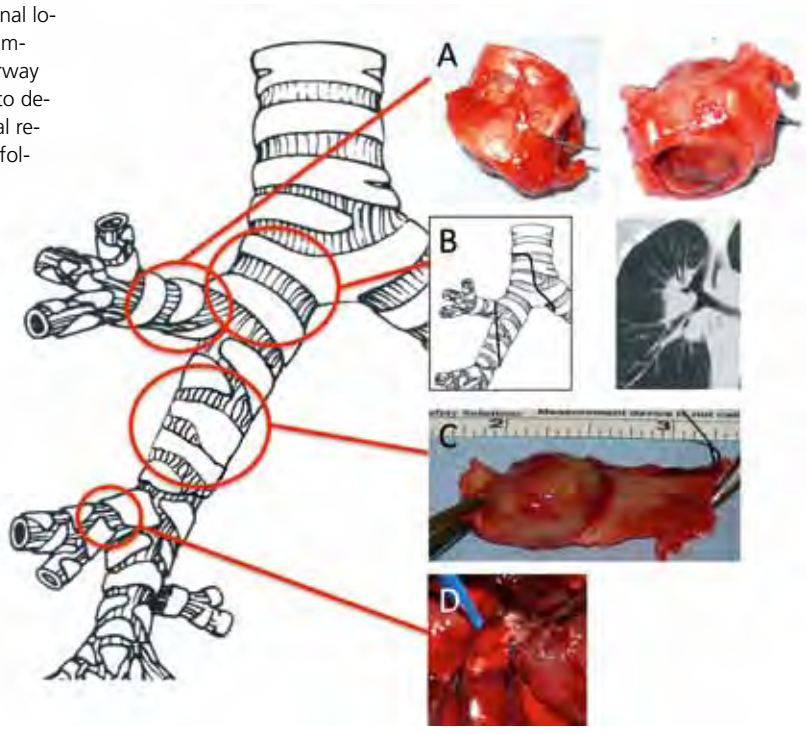
We reviewed the literature of the last 15 years. The pathologies treated are benign or low-grade malignant tumors, most commonly typical carcinoid and other benign conditions such as stricture or trauma. Parenchyma sparing bronchoplastic resection offered a definite solution for endobronchial carcinoids with very low morbidity and mortality (nil in this series of carcinoids, and up to 25% morbidity and with a complication rate around 5%).

As we could show in our series, surgery remains a good and safe treatment option. It has the advantage of dealing with the problem once and for all and in addition gives a complete lymph node staging. Endoscopic treatments are emerging as a valid alternative or complement in the treatment of these tumours. Endoscopy could serve either as a standalone treatment in case of completely respectable tumours or as a first step in case of in-

Kai Nowak

complete endoscopic resection or recurrence. Endoscopic treatment will however not yield a lymph node staging and larger tumours can be removed only in a piece meal technique. The piece meal technique and mechanical manipulation during endoscopic resection impair pathological assessment. Also, although less invasive, it is in a way more cumbersome for the patient, as several sessions may be necessary in order to achieve resection.

In Conclusion we feel that fit patients should be offered surgical resection, reserving endoscopic resection for those that are unfit for surgery or decline it.



Right sided parenchyma sparing bronchial sleeve resection types for endobronchial carcinoids.
A: upper lobe division bronchial sleeve resection
B: central carinal and right main bronchial sleeve
C: bronchus intermedius sleeve resection
D: sleeve resection of the middle lobe bronchus

Cardiac: Abstracts 10:15–11:45 **Room 112**

Prospective analysis of long-term results of aortic valve repair and associated root reconstruction

Marek Jasinski *Dept Cardiac Surgery, Katowice, Poland*

There is an increasing interest in aortic valve and aortic root repair. Valve sparing operations were introduced by Dr T.David and Sir M.Yacoob Another step towards systemic approach was standarization of leaflet management and introduction of aortic regurgitation (AR) classification. proposed by Prof G.El-Khoury

A total 150 patients with severe AR underwent aortic valve repair with or without aortic root, ascending aorta and different concomitant procedures. In hospital mortality was 2,7% (n=4). Causes were multiorgan failure (n=2) and congestive heart failure (n=2). Mean cardiac ischemic time was 88,1min and CPB time was 126,8min..There were five conversions or redooperations during the same admission. Overall survival at 105 months was 95+/-1,9%.

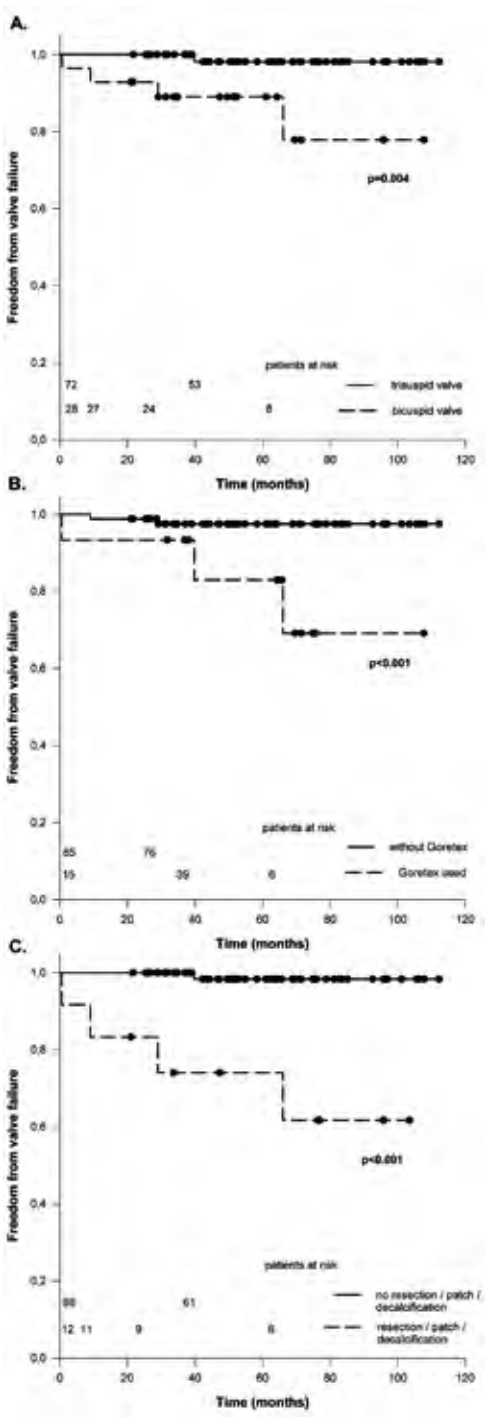
The cusp anatomy was tricuspid in.117and bicuspid in 33 of patients. Leaflet repair management consisted of: free- edge remodelling with Goretex7/0 -16, leaflet plication-.18, triangular resection with or without patch and raphe shaving- 17. Techniques applied for annular stabilization were : subcomissural annuloplasty- 78, and STJ remodelling in.26. Root management was performed as reimplantation-46 and remodelling-41 including fullroot remodelling in 16.

100 patients between 2003 and 2009, were prospectively followed, with closing f-up data at the end of 2011. There were six late redooperations. There were two not valve- related redooprerations: acute dissection of aortic arch and descending aorta (n=1) and chronic dissection of descending aorta in Marfan patient. dissection Other reoperations were caused by: VSD at the level of perimembranous septum (n=1), BAV complex repair failure after raphe excision +/- patch and goretex stabilization. Mean tiem was 107+/- 2,7mths. Overall 6 years freedom from redooperations was. 91,37%.

There were five patients with development of moderate- severe AR. Mean time- 107 +/- 2,5 mths. Overall 5 years treedomfrom AR grade 2+ was 93+/-3,2%. There was one death, late after emergency redo surgery for type B dissection.

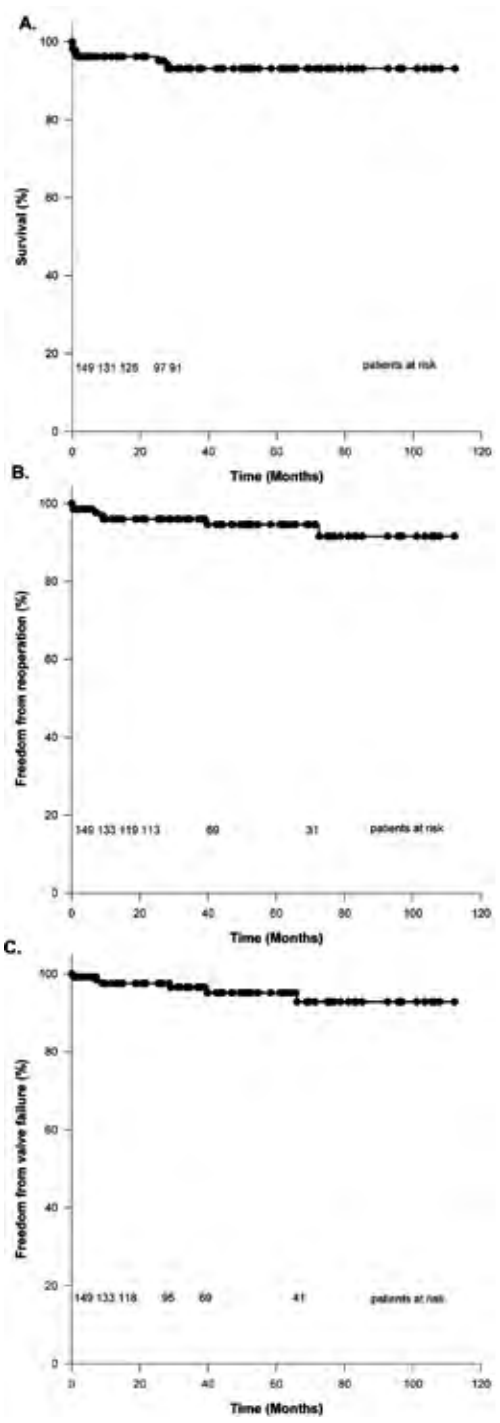
Risk factors of long term survival were: NYHA class, creatynine level, concomitant aorta replacement with valve reimplantation. Risk factors for redooperation were leaflet resection with and without patch and goretex for free edge remodelling. Risk factors for AR2+ (aortic repair failure) were bicuspid aortic valve, goretex leaflet edge remodelling and leflet resection with and without patch.

Aortic valve repair or its sparing is a minority as compared to valve replacement. Probably, the reason being lack of widely accepted systemic approach allowing for clearly reproducible approach. We prospectively followed all patients suitable for repair with the strict protocols classifingy the type of regurgritation and appropriate treatment.As a result there were: type Ia/b- remodelling- 42; type Ib+Ic- reimplantation- 48; Type Ic-78, Type II- 45.



105 months follow-up data from prospectively analyzed cohort of patients shows that aortic valve repair associated with aortic root reconstruction can be performed with satisfactory results and proven its durability.

However, the results can be improved with more aggressive root stabilization during bicuspid aortic valve repair. This may be achieved by : more liberal use of reimplantation strategy,probably easier with Valsalva prosthesis, and plication during leaflet repair.



Cardiac: Focus Session
14:15–15:45 **Room 112**

The transapical approach: A safe technique

Berlin-TAVI-Team *Deutsches Herzzentrum Berlin, Germany*

Transapical TAVI is a safe procedure: In our first 500 consecutive patients with a high risk-profile (mean logistic EuroSCORE 36±21%, mean STS PROM score 16.7%±14%), we observed an overall 30-day mortality rate of 4.6% (4.0% for patients without cardiogenic shock). Access-side related complications were rare: surgical revision for bleeding in 1.4%, and surgical revision for apical pseudoaneurysm in 0.4%, annular rupture in 1.2%. There was only one iatrogenic aortic dissection (0.2%) in a 91-year old patient; treated by transapical placement of an uncovered aortic endostent with good outcome. Neurological complications were rare (major stroke, 1.0%; minor stroke rate, 1.0%). We observed a very low rate of post-procedural paravalvular or valvular regurgitation: 79% of patients were without or only with trace regurgitation and only three patients (0.6%) had regurgitation of grade two.

It is frequently asked what the criteria are in deciding between a transapical and a transfemoral approach. The simplest way is to decide according to the condition of the vascular access (state, presence or absence of peripheral arterial disease, calcifications, diameter of the arteries). The critical vascular status forces to use the transapical approach. But should we simply decide according to the vascular access condition? Transapical implantation has several advantages over the transfemoral (or transaxillary) route. The transapical approach is a direct procedure and independent of the degree of the patient's peripheral arterial disease. Furthermore the advancing of the wire in an antegrade direction through the valve is very easy, rapid, and simple in comparison to the retrograde approach used with transfemoral implantation. It may reduce or eliminate cerebral embolization during this phase of the procedure. We also expect a lower rate of neurologic complications because the danger of embolization during manipulation in the aortic arch is reduced or eliminated by the transapical route.

Transapical and transfermoral approaches are two different therapeutic options for treating the same clinical problem, namely severe aortic stenosis in patients with increased risk from conventional procedures. Both procedures are competitive with conservative therapy or standard aortic valve replacement but they are also competitive between themselves (transfemoral versus transapical or transaxillary). The best treatment option evaluated in each patient should be chosen. In our institution we are able to offer all these options. Our "TAVI team" uses all approaches of transcatheter aortic valve implantation (transfemoral, transapical, transaortic, right and left transaxillary). In this way the same team was able to perform the procedure that is assessed to be really the best for the patient (please distinct between "the best for the patient" and "the best for the team").

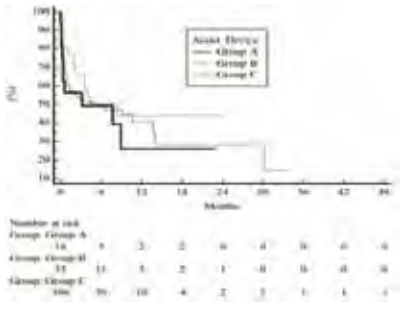
Cardiac: Abstracts 10:15–11:45 **Room 115**

Survival results of intrapericardial third-generation centrifugal assist divice: an intermacs-adjusted comparison analysis

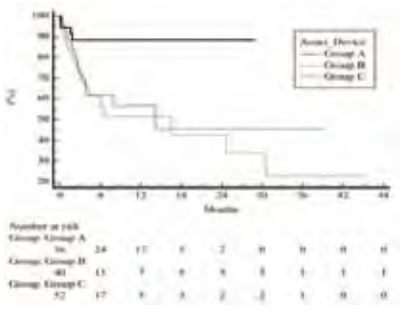
Angelo Maria Dell'aquila *Genova, Italy*

Reports on third-generation centrifugal intrapericardial pumps (HVAD Heartware) are encouraging; however the preoperative level of stability seems to remain the more important predicting factor of mortality. In the present study we sought to compare the survival results of this novel pump with other LVAD systems taking in account the preoperative INTERMACS level. For this purpose a survival analysis was performed in a retrospective series of 287 (INTERMACS Level 1-2 = 158 patients, INTERMACS Level 3-4-5= 129 patients) consecutive patients receiving VAD implantation in our university hospital between February 1993 and March 2012. Assist devices implanted were: group A (HVAD HeartWare n=52) group B (previous Continous-flow LVAD, INCOR n= 37, VENTRASSIST n= 7, DE BAKEY n= 32) and group C (pulsatile systems n=159). After cumulative support duration of 54,436 days and mean follow-up of 6.21 ± 7.46 months (range 0 to 45.21 months) a total of 185 pts. was successfully bridged to transplantation, five patients could be weaned from the device. Log-rank analysis revealed a survival of 82.0%, 70.4%, 70.4% for group A, 84.0%, 48.2%, 33.7% for group B and 71.6%, 46.1%, 33.8% for group C at 1,12 and 24 months respectively with a significantly (p= 0.013) better outcome for group A. When stratifying the survival on the basis of INTERMACS level, no significant survival improvement was observed among all patients who underwent LVAD implantation in INTERMACS 1-2 (p= 0.47). In those patients, MOF followed by neurological events were the most frequent cause of mortality (24.05% and 13.92% respectively). We conclude that despite pump innovations, prognosis of those high-risk patients after VAD implantation remains poor and seems not to be enhanced by advancement of technology.

On the other hand, among patients, who underwent elective LVAD implantation, group A exhibits a significantly (p= 0.005) better outcome when compared with the other INTERMACS matched groups (B-C) with a survival rate of (88.8% group A versus 34.2% group B and 45.6% group C at 24 months). Among patients who underwent elective VAD implantation (INTERMACS level of 3-4-5) similarly to patients in INTERMACS 1-2, MOF followed by neurological events were the most frequent cause of mortality (10.08% and 9.3% respectively). However, Log-Rank analysis showed a significantly lower incidence of neurological events causing death in group A with a freedom from neurological events causing death of 97% for the 3rd generation pumps versus 83% and 78% for the older continuous devices and pulsatile systems at one year respectively. This difference might be explained by the better biocompatibility of materials and lower mechanical bearings between the impeller and the pump housing of the HVAD minimizing the occurrence of thromboembolic events. In conclusion elective Heart Ware HVAD system implantation shows notable survival outcomes. Moreover preoperative unstable hemodynamics results in a poor prognosis independent of pump generation.



Legend: Stratified survival comparison among the three groups undergoing VAD implantation in cardiogenic shock (INTERMACS 1-2)



Legend: Stratified survival comparison among the three groups that undergoing elective VAD implantation (INTERAMACS 3-4-5)

Congenital: Abstracts 14:15–15:45 **Room 111**

Repair of incompetent truncal valve: early and mid-term results

Gianluigi Perri[a], Sergio Filippelli[a], Angelo Polito[b], Duccio Di Carlo[a], Sonia B. Albanese[a], Adriano Carotti[a] *Bambino Gesù Children's Hospital IRCCS, Rome, Italy.*

Truncus arteriosus is a congenital heart disease occurring in approximately 0.04% of 1,000 live births. Truncal valve incompetence is a challenging complication associated with a high rate of early and late mortality. We report our experience with truncal valve repair and analyze the factors associated with in-hospital mortality and mid-term significant neo-aortic regurgitation.

Eleven children underwent truncal valve repair at our institution during the study period. Techniques for repair included bicuspidalization through leaflet approximation associated with triangular resection in two patients (18%) and either bicuspidalization or tricuspidalization of truncal valve through excision of one leaflet and related sinus of Valsalva in nine cases (82%). Moreover three of the latter patients underwent coronary detachment before cusp removal followed by coronary reimplantation, due to coronary arterial impediment. There were two early in-hospital deaths (18%), in one case related to the technique of valve repair (cusp removal without coronary reimplantation causing coronary distorsion). Freedom from significant (moderate or severe) neo-aortic regurgitation was 76.2% and 60.9% at one and two years respectively (Fig.1).

Freedom from reintervention at two years was 91%. Severe neo-aortic regurgitation was present in two children: in one child who underwent leaflet approximation and triangular resection without cusp removal and in one who underwent bicuspidalization through leaflet and sinus of Valsalva excision followed by coronary reimplantation. The latter patient developed severe neo-aortic regurgitation four months later, despite a satisfactory early postoperative result. Statistical analysis showed age less then 1year (p=0.05), weight less then 3kg (p=0.02), and longer cross clamping time (p=0.008) as risk factors for hospital mortality. Furthermore, there was a trend towards association between development of significant aortic insufficiency and absence of cusp removal at time of repair (Fig.2).

Our institutional policy is based on aggressive approach to truncal valve repair at the time of neonatal primary correction when significant aortic regurgitation is present to avoid the risk of prolonged myocardial ischemia. In the majority of cases we performed the cusp removal technique and select for excision the smallest leaflet and related sinus of Valsalva. The benefit of this annulovalvuloplasty is to remodel the neo-aortic valve without suturing on the leaflets, avoiding excessive systo-diastolic stress on the repair and related risk of leaflet suture disruption. Also, despite the fact that cusp removal technique would allow to sacrifice the smallest cusp, we suggest to avoid the excision of the cusp overriding the area of VSD closure in order to avoid blood flow turbulence causing increased stress on the ventricular side of the neo-commissure and eventually its early disruption.

Our experience suggests that the correct application of the cusp reduction technique might decrease the rate of post-operative significant neo-aortic regurgitation. As long as leaflet excision is performed, coronary detachment before cusp removal followed by coronary relocation might reduce the risk of myocardial ischemia by avoiding traction to the coronary arteries.

Gianluigi Perri

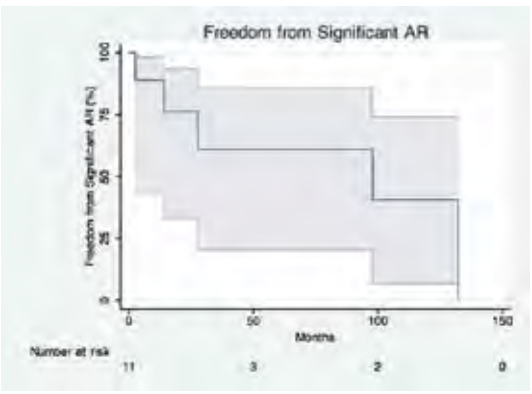


Figure 1

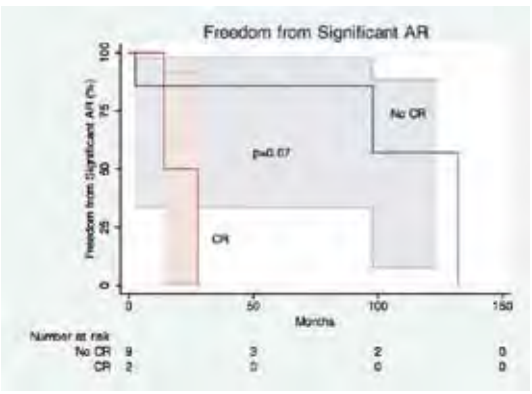


Figure 2

Cardiac: Abstracts 10:15–11:45 **Room 112**

Aortic valve reconstruction with autologous pericardium for dialysis patients

Isamu Kawase *Toho University Ohashi Medical Center, Tokyo, JAPAN*

In the past, chronic hemodialysis for end-stage renal disease (ESRD) was considered a contraindication to major cardiac surgery. Nowadays, many patients on hemodialysis undergo heart surgeries. The longer the life expectancy of dialysis patients is becoming, the more patients may become candidates for major cardiac surgery. Major reasons for death of the patients on dialysis were heart failure, cerebral infarction, cerebral hemorrhage, gastro-intestinal bleeding, and infection. For the prevention of these factors, we need the better heart valve surgery with good hemodynamics and post-operative warfarin-free condition, and to avoid foreign body implantation as much as possible. To search the ideal surgical treatment of aortic valve disease, our original aortic valve reconstruction using glutaraldehyde-treated autologous pericardium for dialysis patients was reviewed. Our original aortic valve reconstruction was invented by Professor Ozaki. And, Prof. Ozaki and I have been performing this operation for more than five years. Some surgeons are calling this procedure as Ozaki operation.

Aortic valve reconstruction has been performed for 404 cases from April 2007 through September 2011. Among them, 54 cases on hemodialysis were retrospectively studied. Forty-seven patients had AS, 5 had AR, and two had infective endocarditis. Mean age was 70.2±8.5 years old. There were 35 males and 19 females. There were 27 primary aortic valve reconstructions, 11 with CABG, six with ascending aortic replacement, five with mitral valve repair, and four with Maze. First in the procedure, harvested pericardium is treated with 0.6% glutaraldehyde solution. After resecting cusps, we measure the distance between commissures with original sizing instrument. Then, pericardium is trimmed with original template. Three cusps are sutured to each annulus (Figure 1). Peak pressure gradient was averaged 66.0±28.2 mmHg preoperatively, and decreased to 23.4±10.7, 13.8±5.5, and 13.3±2.3 respectively one week, one year, and three years after the operation. No calcification was detected with echocardiographic follow-up. Recurrence of AR was not recorded with the mean follow-up of 847 days except for one case re-operated for infective endocarditis 2.5 years after the operation. Three hospital deaths were recorded due to non-cardiac cause. Other patients had been in good conditions. There was no thromboembolic event. Survival rate of 79.6% and freedom from reoperation rate of 95.2% at about five years follow-up were calculated by Kaplan-Meier method.

Medium-term results were excellent. Since warfarin for the dialysis patients becomes problematic, post-operative warfarin-free status is desirable. Aortic valve reconstruction can give the better quality of life for the patients on dialysis with good hemodynamics and warfarin-free condition. This operation might have the possibility to become one of the standard surgical treatments for aortic valve disease in dialysis patients.

Isamu Kawase (left) and Professor Ozak

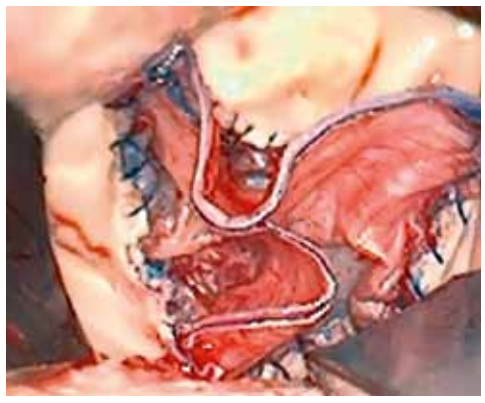


Figure1: Completion of aortic valve reconstruction

Cardiac: Abstracts 14:15–15:45 **Room 116/117**

Comparison of the euroSCORE II and Society of Thoracic Surgeons 2008 risk tools

Bil Kirmani *UK*

"What are my chances?" vs "Am I going to die?"

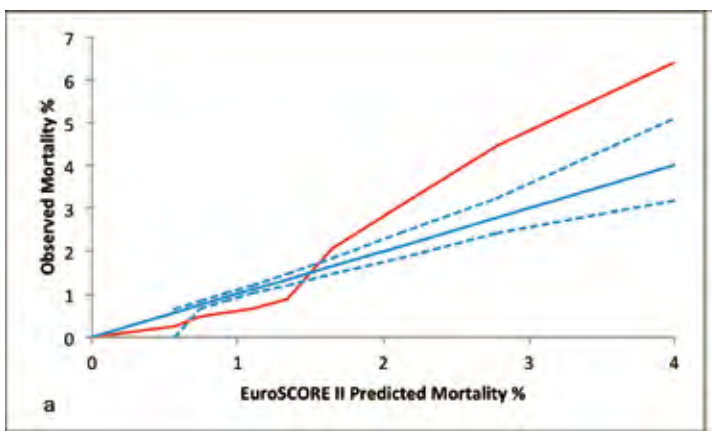
Successive iterations of the EuroSCORE and Society of Thoracic Surgeons calculators have established the trend for incrementally refining the answer to the former question. Ultimately, however, the search for the perfect risk calculator is as futile as trying to answer the latter.

The original risk stratification tools had good discrimination, or the ability to distinguish between lowest, higher and highest risks – in fact, much the same as we see with the new calculators. But the demand for good calibration, the ability to mean four in a hundred patients when the risk is 4%, puts the tools under new scrutiny. The Area Under the ROC curve has been joined by the Hosmer-Lemeshow test in determining whether or not a risk tool is accurate or not. It breaks the test population into ten equally sized deciles and compares the observed and expected mortality in those deciles. Expected mortality of, for example, 1%, 2%, 3%, 4% etc. must be approximately those values and not consistent ratios thereof. An observed mortality of 0.5%, 1%, 1.5%, 2% would therefore fail the test as the groups are clearly not the same.

The rationale behind the Hosmer-Lemeshow test is sound: an individual patient will always have a mortality of either 0% or 100%, which makes every individual prediction always wrong. A test based on this comparison would show poor calibration. However, on the other end of the spectrum, if the outcome for the entire test population is averaged and the predicted mortality equals the observed mortality, this does not mean that the calculator is well calibrated. Somewhere between these two dichotomies, exists an appropriate division of the population to assess calibration. The Hosmer-Lemeshow typically utilises ten groups of equal size, but could equally use three (low, medium and high risk, for example) or five or one hundred. We demonstrate the effect of using a percentile rather than decile division of groups. While this still gives a highly significant P-value (variation in any one group means the test fails), the graphical representation gives a clearer idea of how the calculator fails.

In our retrospective series of nearly 15,000 patients, we examined the external validity EuroSCORE II and the STS Risk Score from 2008. Neither is a "back of the envelope" calculation any more, and both demonstrate equivalent discrimination for a wide range of procedures, including many that the STS score never intended to predict for. C-statistics were consistently in the 0.8 region, suggestion moderately good discrimination of both tools. The Hosmer-Lemeshow test was failed by both calculators (p<0.0001 in all cases) but, as above, we question the reliability of this test as it currently exists in large test groups.

Over several decades, our tools for risk stratification have become increasingly well-adjusted, allowing us to not only estimate the outcomes for our patients, but to benchmark our results and standardise care.



Vascular: Abstracts 14:15–15:45 **Room 113**

Conventional elephant trunk vs frozen elephant trunk technique in treatment of patients with thoracic aortic disease – effect on neurological complications

Leontyev S., Borger M.A., Etz C.D., Moz M., Seeburger J, Bakhtiary F., Misfeld M, Mohr F.W. *University of Leipzig, Leipzig, Germany.*

The conventional elephant trunk procedure, developed by Borst in the 1980s[1], became the standard approach for patients with extensive pathology of the thoracic aorta involving the arch and the descending / thoracoabdominal aorta. This procedure, however, remains a surgical challenge associated with a significant operative and interval mortality, and a high incidence of neurological complications[2,3]. In the current endovascular era, new technical solutions have been developed to treat these patients. Since the mid – 90s, endovascular or hybrid operations such as debranching procedures[4] or the frozen elephant trunk technique[5] were introduced into clinical practice.

We compared the clinical results after a conventional elephant trunk (cET) approach to the new frozen elephant trunk (FET) technique in order to determine the effects on neurological outcome, most importantly ischemic spinal cord injury. A total of 171 consecutive patients underwent aortic arch / descending aorta replacement with a cET (n=125) or FET (n=46) procedure over an 8 year period. The majority of patients presented with either acute or chronic aortic dissection, and a cET procedure was performed significantly more often in patients with acute Type A aortic dissection. The intraoperative variables were similar between the two patient groups, with the only difference being that that the mean nasopharyngeal temperature was higher in patients undergoing FET surgery. The 30-day mortality and overall occurrence of permanent neurological deficit was not statistically significant different between study groups. The multivariate analysis identified acute type A aortic dissection as the only independent predictor for 30-day mortality and permanent neurological deficit.

We found a significantly higher incidence of paraplegia in patients who underwent a one-stage FET procedure (21.7% vs 4%, p<0.01). Furthermore, FET was identified as an independent risk factor for permanent paraplegia. Among FET patients, multivariate analysis identified a nasopharyngeal temperature during circulatory arrest of 28 degrees or higher in combination with duration of circulatory arrest more than 40 minutes as the only independent predictor for permanent spinal cord injury.

Sergey Leontyev

Paraplegia is one of the most dreaded—but historically rare —complications of elephant trunk surgery. The reported incidence of spinal cord injury in patients undergoing FET appears to be significantly higher than for conventional ET procedures[6]. In our opinion, the occurrence of spinal cord injury is multifactorial and mostly influenced by a combination of acute ischemic injury during distal circulatory arrest at mild to moderate hypothermia, and postoperative hemodynamic fluctuations after extensive segmental artery occlusion. FET procedures, however, have the potential to impact on both inflow pathways simultaneously: segmental artery perfusion and upper inflow to the Collateral Network via the vertebral artery. This might be the reason for the increased occurrence of paraplegia and the significantly higher incidence as compared to cET procedures.

In conclusion, the frozen elephant trunk implantation procedure can be performed with a relatively low mortality rate, but is associated with an increased incidence of permanent paraplegia due to ischemic spinal cord injury. A prolonged distal arrest time of more than 40 minutes, particularly in combination with a core body temperature of more than 28 degrees, is an independent predictor of paraplegia in FET patients. More pronounced hypothermia should be used during FET surgery, particularly in patients with expected prolonged circulatory arrest times.

References

1 Borst HG, Walterbusch G, Schaps D. Extensive aortic replacement using "elephant trunk" prosthesis. The Thoracic and cardiovascular surgeon 1983;31:37-40.

2 Khaladj N, Shrestha M, Meck S, Peterss S, Kamiya H, Kallenbach K, Winterhalter M, Hoy L, Haverich A, Hagl C. Hypothermic circulatory arrest with selective antegrade cerebral perfusion in ascending aortic and aortic arch surgery: a risk factor analysis for adverse outcome in 501 patients. The Journal of thoracic and cardiovascular surgery 2008;135:908-914.

3 Misfeld M, Leontyev S, Borger MA, Gindensperger O, Lehmann S, Legare JF, Mohr FW. What is the best strategy for brain protection in patients undergoing aortic arch surgery? A single center experience of 636 patients. The Annals of thoracic surgery;93:1502-1508.

4 Buth J, Penn O, Tielbeek A, Mersman M. Combined approach to stent-graft treatment of an aortic arch aneurysm. J Endovasc Surg 1998;5:329-332.

5 Kato M, Ohnishi K, Kaneko M, Ueda T, Kishi D, Mizushima T, Matsuda H. New graft-implanting method for thoracic aortic aneurysm or dissection with a stented graft. Circulation 1996;94:II188-193.

6 Jakob H, Tsagakis K, Pacini D, Di Bartolomeo R, Mestres C, Mohr F, Bonser R, Cerny S, Oberwalder P, Grabenwoger M. The International E-vita Open Registry: data sets of 274 patients. The Journal of cardiovascular surgery;52:717-723.

Cardiac: Focus Session 14:15–15:45 **Room 112**

Will the transapical approach become a percutaneous procedure? Outlook on new transapical companion devices

Jörg Kempfert
Kerckhoff Clinic, Bad Nauheim, Germany

Over the last years the technique of transcatheter aortic valve implantation (TAVI) has evolved to a routine procedure in many centers to treat elderly high-risk patients suffering from severe symptomatic aortic stenosis. The transapical approach (TA-AVI) offers the advantage of a truly minimally-invasive direct and axial access to the aortic valve that has been proven to be extremely safe with very low rates of access site related complications (<1%) while at the same time facilitating unmatched device control (short distance) and a "no touch" approach in regard to the ascending aorta and aortic arch (stroke risk).

Although the TA approach has to be considered a truly minimally-invasive procedure already it still involves a surgical cut-down using a 5cm skin incision and an anterolateral mini-thoracotomy. To further reduce the invasiveness of the approach and to further standardize ventricular access several so called "apical closure devices" are under development. Such devices might facilitate the transition to a fully percutaneous transapical approach soon.

The presentation focuses on the different emerging device concepts and will give an update on each device status.

At present, four different device concepts are just about to start clinical trials or have already been successfully used within "FIM" trials:

The Apica ASC device (Figure 1) relies on circular myocardial compression using a "sealing coil" meant to seal para-sheath bleeding during the actual TAVI implantation (Figure 2 left) followed by secure sealing of the ventricular access by using a "closure cap" after removal of the TAVI-sheath (Figure 2 right). Several successful cases have been already performed within a multicenter CE-mark trial with overall very promising results.

The second device concept that has been used within first clinical cases just recently applies myocardial anchors that create an "operating window" which is then used to insert TAVI devices. After valve deployment the Permaseal device (Micro Interventional Devices) facilitates immediate self-closure (Figure 3).

Other promising concepts include the EnTourage system which relies on helical transmural sutures and the CardiApex™ approach which not only offers apical closure but percutaneous puncturing from the "inside". Both devices have demonstrated proof of concept within animal trials and are just about to enter first clinical trials.

In summary, the field of transapical closure devices is emerging rapidly suggesting that fully percutaneous TA-AVI procedures might become reality very soon.

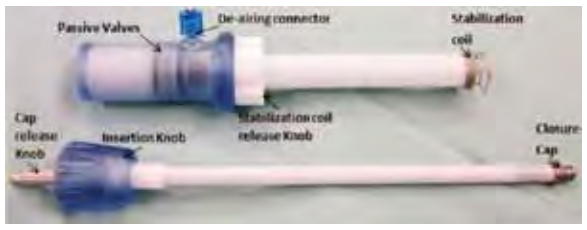


Figure 1: Apica ASC™: transapical access and closure device

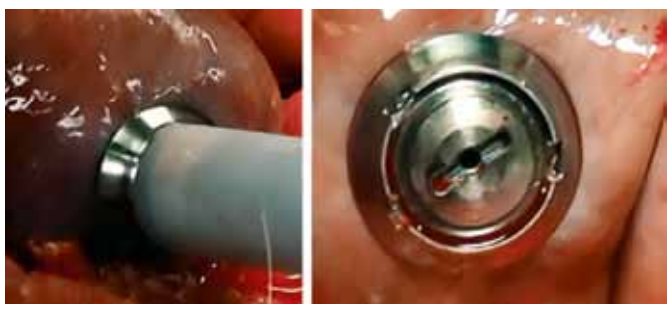


Figure 2: Apica ASC left: Step1 "sealing coil", right: Step2 "closure cap"

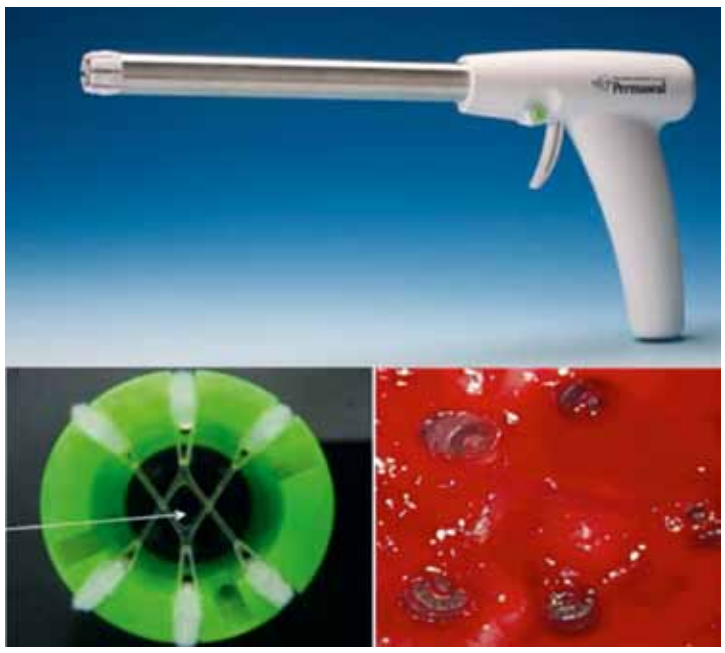


Figure 3: Permaseal apical closure device facilitating immediate "self-closure"

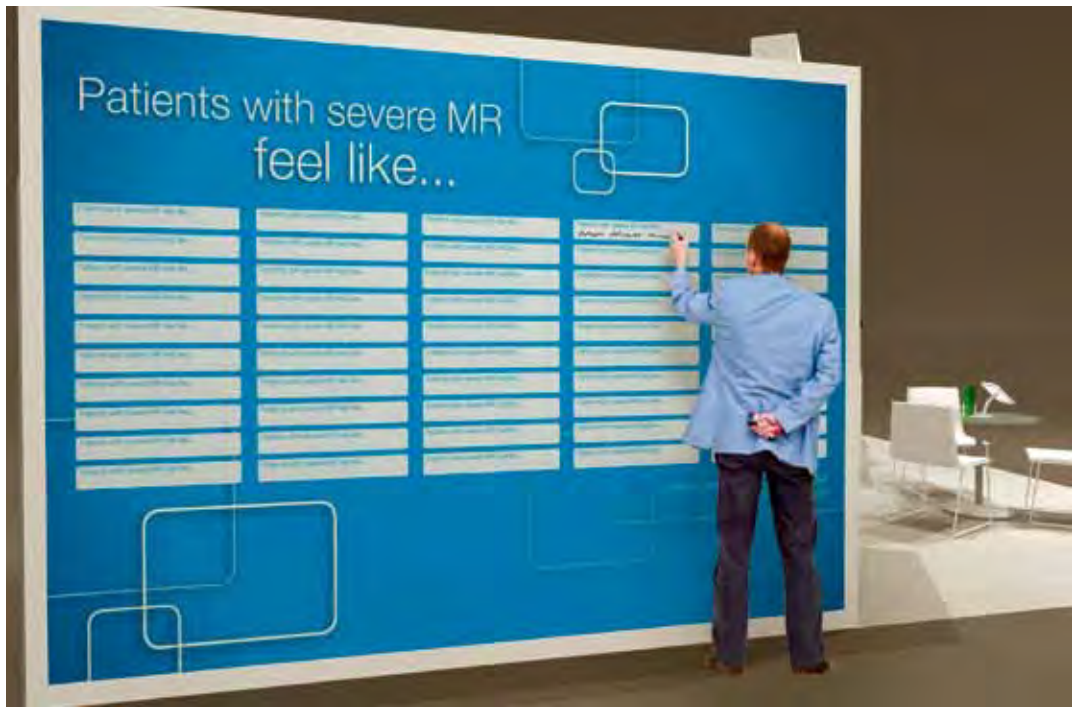
"Express yourself!"

Express yourself through completion of the sentence: "patients with severe MR feel like …!"

That is the call to action at the Abbott Vascular booth throughout the EACTS congress this year. In an effort to raise awareness of the debilitating burden of Mitral Regurgitation, physicians have the opportunity to write on a dedicated wall of Abbott's booth about how their patients feel.

Mitral Regurgitation is a deadly and pervasive disease that often goes unchecked until it is too late. Nearly half of patients referred for surgery are declined surgical repair or replacement because of multiple co-morbidities and advanced age. Visually representing the severe clinical impact of the disease is a powerful reminder of how much more we can do for these patients. The more – and sooner - the medical community screens for MR and refers patients, the better the outcome. After the congress, a summary of your notes will be made available and shared with other specialties across Europe. Take the opportunity for your opinions to be seen and your patient's feelings to be heard.

Express yourself through completion of the sentence: "patients with severe MR feel like …!"



Cardiac: Abstracts 10:15–11:45 **Room 116/117**

Is the new euroSCORE II a better predictor for transapical aortic valve implantation?

Martin Haensig *University of Leipzig, Germany*

Conventional surgical risk-scores are used to identify suitable candidates for transapical aortic valve implantation (TA-AVI) at present. The two most commonly used risk-scores are the European System for Cardiac Operative Risk Evaluation (EuroSCORE) and the Society of Thoracic Surgeons Predicted Risk of Mortality (STS-PROM). Both, developed to assess mortality risk for cardiac surgical procedures. Whereas the EuroSCORE was initially conducted in 1995 and first published in 1999, the STS-Score was initially developed in the late 1980s and its current model for solely isolated aortic valve replacement (AVR) introduced in 2007.

Inasmuch as both models were based on patients who have actually undergone surgical AVR, their accuracy in selected high-risk patients is necessarily speculative. Still, they are the best tools we currently have to help select patients and assess outcomes.

While advances in surgical techniques and perioperative care have steadily reduced the procedural risk of AVR, the changing risk profile of surgical patients over the last decade led the EuroSCORE investigators to develop a revised version, the EuroSCORE II. The aim of this study was to compare the predictive ability and properties, as well as the correlation of the new EuroSCORE II to the surgical risk-scores currently in use.

From Feb/2006 to May/2011, 360 consecutive high-risk patients, age 81.6 ± 6.4 years, 64.4% female, were included using the Edwards SapienTM prosthesis and a transapical approach. The STS-Score and EuroSCORE II ($r = 0.504$, $p < 0.001$) showed a good correlation, whereas a strong correlation was found between the logistic EuroSCORE and EuroSCORE II ($r = 0.717$, $p < 0.001$). 30-day and in-hospital mortality rate were 10.6% (38/360) and 11.4% (41/360). In-hospital mortality rate was estimated by the logistic EuroSCORE: 30.0 ± 15.7%, the STS-Score: 11.7 ± 7.8%, and the EuroSCORE II: 6.7 ± 5.1%. The prognostic value of the STS-Score, logistic EuroSCORE and the recent EuroSCORE II systems was analyzed in ROC curve analysis for the prediction of 30-day (AUC: 0.64 vs. 0.55 vs. 0.50) and in-hospital mortality (AUC: 0.65 vs. 0.54 vs. 0.49). Even in the absence of a high preoperative surgical risk many 'extreme' or rare conditions (porcelain aorta, frailty or previous chest radiation etc.) will justify a TAVI procedure.

To shed light on the performance of the new EuroSCORE II, we present a single-center analysis in 360 transapical patients. In patients undergoing TA-AVI, the new EuroSCORE II correlates strongly with the logistic EuroSCORE, but is a poorer predictor of 30-day and in-hospital mortality than the STS-Score. The new EuroSCORE II may actually underestimate 30-day and in-hospital mortality risk in high-risk patients. A true TAVI risk-score would be desirable beyond the established scores. The results will be presented separately during the meeting.

Residents' Session 14:15–15:45 **Room 118/119**

Tissue engineering of the right heart outflow tract by a cell-seeded bioabsorbable poly-L-lactic acid valved tube

David Kalfa *University Paris Descartes Sorbonne Paris Cité, Paris, France.*

Current devices used in clinical practice for the surgical repair of the right ventricular outflow tract (RVOT) in congenital cardiac diseases are inert materials without growth potential and require multiple reoperations[1-3].

The primary objective of our study is to restore an autologous, living valved RVOT in a growing lamb model, using a tri-leaflet valved tube made of bioabsorbable poly-L-lactic acid seeded with autologous mesenchymal stem cells (MSC). Secondary aims are to prove the growth potential, absence of degeneration and the valvular competence at mid-and long-term of this device.

The proof of concept was made *in vivo* by implanting bioresorbable valved patches made of polydioxanone and seeded with autologous peripheral blood-derived MSC into the RVOT of six three-month-old lambs and evaluated by MRI and immunohistochemistry up to eight months after surgery[4]. Tissue-engineered RVOT were neither stenotic nor aneurismal and displayed a growth potential, with less fibrosis, less calcifications and no thrombus compared with control polytetrafluoroethylene/pericardial patches. The polydioxanone scaffold was completely degraded and colonized by host cells, leading to a viable, three-layered, endothelialized tissue and an extracellular matrix with elastic fibers similar to that of native tissue[4]. The non-optimal mechanical characteristics of polydioxanone led us to consider poly-L-lactic acid for further experiments[5].

First generations of tubes and valves were performed, using woven poly-L-lactic acid and a copolymer of {poly-L-lactic acid and polyester} respectively. A computer-assisted modeling defined the geometry of the tri-leaflet valve and its insertion within the conduit. In vitro mechanical tests demonstrated a high burst strength performance of the tube (mean: 303±43N). An excellent water permeability (0.01 mL/min/cm²) was obtained by improving the collagen coating and the surface design of a second-generation crimped tube. A dynamic biphasic bioreactor was customized to perform efficient in vitro cell-seeding (3,5x106 MSC /cm² for 10 days) and maturation of the polymeric tube. The first *in vivo* implantation of poly-L-lactic acid bioabsorbable tube (unvalved – unseeded) in a 12-kg-lamb displayed at a four-month follow-up the absence of stenosis, aneurysm, thrombus, and histological evidence for an endothelial lining but a high collagen density.

The competence, dynamics and fatigue of the valve will be tested in vitro. Three types of valved tubes are planned to be implanted in growing lambs with a 12-month follow-up: PLLA + autologous MSC (n=8); PLLA + allogenic MSC (n=4) in sex-mismatched recipients (to identify the origin of the cells present in the tube); and "standard-of-care" control tubes made of polyethylene terephtalate (Dacron) associated with a porcine biological valve (n=3). The mechanical results and histological outcomes of the explanted conduits will ultimately dictate the choice of the polymer and the ways of optimizing its manufacturability.

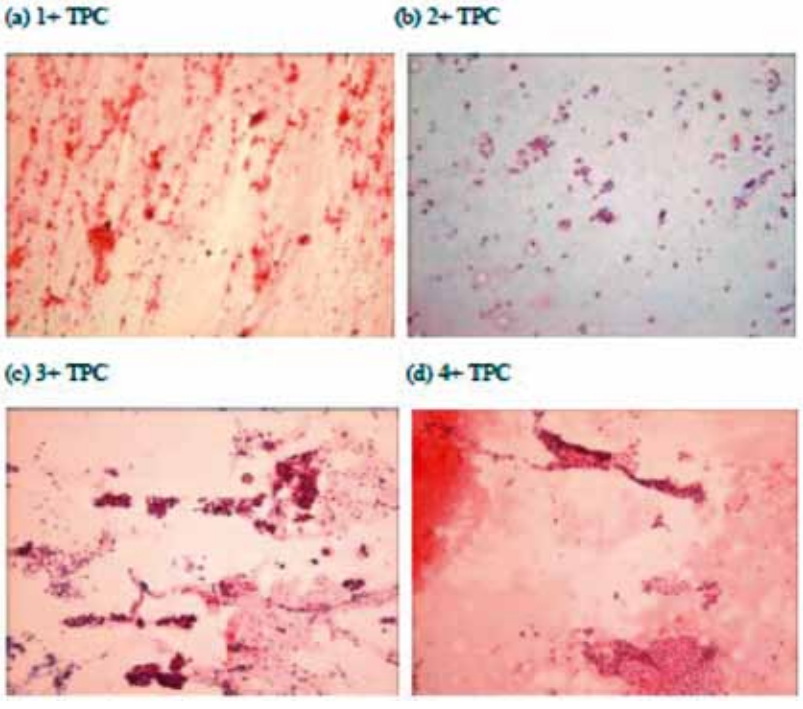
References

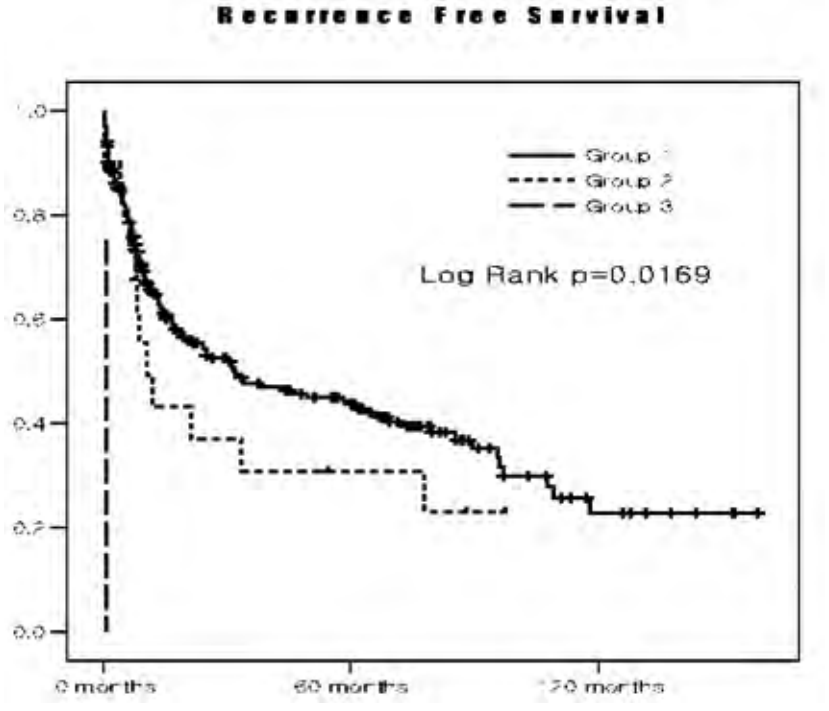
1. D Kalfa, et al. J Thorac Cardiovasc Surg 2011 October;142(4):950-3.
2. D Kalfa, et al. Eur J Cardiothorac Surg, 2012, doi: 10.1093/ejcts/ezs248.
3. D Kalfa, et al. Eur J Cardiothorac Surg, 2012, doi:10.1093/ejcts/ezs367.
4. D Kalfa, et al. Biomaterials. 2010 May;31(14):1056-63.
5. D Kalfa, et al. Journal de Chirurgie Thoracique et Cardio-Vasculaire, 2012 March;16(1):20-32.

Thoracic: Abstracts 14:15–15:45 **Room 113/114**

Occult pleural dissemination of cancer cells detected using touch print cytology method during surgery shows survival impact

Doosang Kim
Seoul Veterans Hospital, Seoul, South Korea





A retrospective clinical study from Seoul reported survival differences between Touch Print Cytology subgroups when Touch Print Cytology test was performed during NSCLCa surgery for detecting occult pleural dissemination of cancer cells. The study enrolled 256 patients who have been conducted both Touch Print Cytology and Pleural Lavage Cytology using glass slides and saline[1]. The glass slides were examined and graded as negative TPC, positive TPC 1+ (a few cells, less than 10 cells), 2+ (cell nests, more than 10 cells aggregated), 3+ (clusters, more than fifty cells aggregated), and 4+ (diffuse). In this study, negative TPC, positive TPC 1+, and positive TPC 2+ are designated as Group I, 3+ as Group II and 4+ as Group III. The patients who has high grades TPC show poor survival results (Recurrence Free 5YSR and Median Survival Time of each group are 43.6%, 30.8%, 0% and 32.03m, 10.50m, 0.03m (p=0.0169), respectively.)

This study results are consistent with International Pleural Lavage Cytology Collaborators' 2010 reports, which showed survival difference of PLC result from 8,763 individual data of 11 institutes internationally with statistical significance [2]. Clinical relevances of Touch Print Cytology were reported previously by other groups [3, 4].

Pleural cavity is a potential space which cancer cells could be disseminated. Malignant pleural effusion is classified as M1a, according to the revised TNM-7 staging in 2009, which was designated previously as T4 at TNM-6 in 1997. However, occult pleural dissemination of cancer cells, which has no definite effusion, is not classified yet, because it is difficult to detect using pleural lavage cytology during surgery due to its low sensitivity range of 4-14% and not sufficient evidence-based results. Touch print cytology was adopted and used to detect occult pleural dissemination of cancer cells easily by Seoul group. The survival impact of this finding was remained to be elucidated before this report.

From this study, two findings are made evidently. One is the presence of occult pleural micrometastasis and the other is its clinical relevance of pleural micrometastasis. The study group suggests that only TPC grades over 3+ should be considered as clinical relevance to pleural micrometastasis. Obviously not the appearance itself but the amount of malignant cells seen is of importance in pleural micrometastasis.

References

1 Kim D, Ryu W, Cho SJ, Kim J, Park S. Touch print cytology shows higher sensitivity than pleural lavage cytology for pleural micro-metastasis in lung cancer. Interact CardioVasc Thorac Surg 2005;4:70-74.
2 International Pleural Lavage Cytology Collaborators. Impact of positive pleural lavage cytology on survival in patients having lung resection for non small-cell lung cancer: An international individual patient data meta-analysis. J Thorac Cardiovasc Surg 2010;139:1441-1446.
3 Safai A, Razeghi A, Monabati A, Azarpira N, Talei A. Comparing touch imprint cytology, frozen section analysis, and cytokeratin immunostaining for intraoperative evaluation of axillary sentinel lymph nodes in breast cancer. Indian J Pathol Microbiol; 2012 Apr-Jun;55(2):183-6.
4 Alayouty HD, Aminmm, Aloukda AW, Bafakeer SS, Sulieman DD. Should three slide-touch print cytology replace pleural lavage cytology for detection of pleural micrometastasis in cases of bronchogenic carcinoma? Interact CardioVasc Thorac Surg 2011;12:728-732.

Vascular: Abstracts 16:15–17:45 **Room 113**

Total aortic arch replacement with frozen elephant trunk: 10-year single center experience

Malakh Shrestha, Andreas Martens, Felix Fleissner, Fabio Ius and Axel Haverich *Hannover Medical School.*

Objective

Combined pathology of the aortic arch and the descending aorta (aneurysms and Dissection) remains a surgical challenge. Different techniques have been proposed. In a two stage operation, at the first stage, the aortic arch is replaced through a median stenotomy and during the second stage, the descending thoracic aorta is replaced through a lateral thoracotomy. Professor Hans Borst and colleagues introduced so called 'Elephant trunk' technique in 1982 at our center, greatly simplifying this two stage technique. However, a major disadvantage of this approach was the need for two operations with its associated mortality and morbidity as well as the fact that at least some mortality in the interval between the two operations due to the rupture of the untreated segment of aorta.

With the 'frozen elephant technique' (FET), the aortic arch is replaced conventionally and an endovascular stent-graft is placed into the descending aorta in antegrade manner through the open aortic arch, thereby potentially allowing for a 'single –stage' operation, especially in pathologies limited to the proximal descending aorta. Publications with Long term follow-up results are sparse. We present our 10 year results.

Methods

Between 2001- 01/2012, FET was implanted in 131 patients (95 males, 61±13 years). The indications included 91 aortic dissections (Type A (acute and Chronic): n= 78, type B (acute and chronic): n=13) and aortic aneurysms (n=40), respectively. Median follow-up was 42 ± 37 months. 40 patients had undergone previous cardiac operations. Concomitant procedures included 25 Bentall, 26 CABG, 17 David, 5 Yacoub and 8 aortic root repairs, respectively.

Three different FET prostheses, custom-made (n=66), Jotec-E®-vita (n=30) and Vascutek (n=35) prosthesis were used. The cerebral protection was done moderate hypothermic circulatory arrest (MHCA) and selective antegrade cerebral perfusion (SACP).

Results

Intra-operative mortality was 1.6%(n=2) and in-hospital mortality was 14.17% (n=20). CPB, X-clamp, MHCA and SACP times were 238±70, 137 ±51, 58±24, and 69±31 minutes respectively. Complications included re-thoracotomies 18% (n=24), acute renal failure leading to Dialysis 16% (n=21), paraparesis 3.1% (4) and stroke 14.7% (n=19).

Thirty-six patients underwent follow-up procedure on the downstream aorta, either endovascular (n=16), open surgery (n=20), respectively.

One, five and ten-year survival was 82±3, 72±5 and 58±8 years, respectively.

Conclusion

FET concept adds to the armament of the surgeon in the treatment of complex and diverse aortic arch pathology. The initial learning curve, acute dissections, re-do and concomitant procedures partially explains the higher mortality rate. Nevertheless, our experience demonstrates acceptable short and long-term results in treating this complex disease cohort. Our series shows that in carefully selected patients with combined pathology of the aortic arch and the proximal descending aorta, the FET procedure allows for a 'single-stage' procedure.

Congenital: Abstracts 14:15–15:45 **Room 111**

Outcome of a valve-repair oriented strategy for the aortic valve in children

Ahmed Abousteit *UK*

Over the past three decades a significant progress has been achieved in the management of aortic valve disease in paediatrics, mostly as a consequence of the overall improvements in cardiac surgery methods and outcomes.

Background

Management of the aortic valve disease in paediatric population has an ongoing controversy of which is the best treatment option for this age group. The options available are replacement with a valve substitute [mechanical, bioprosthesis, homograft, or autograft (Ross procedure)], or various techniques of valve repair.

Centres and surgeons vary in their approach and all are trying to support their predilection; and as time passes, data are compiling giving us more chance to analyse, compare and prefer.

Objective

In our centre, we have a trend towards repair and we aimed at evaluating the mid-term results of our interventions.

We performed thirty nine aortic valve repairs in children between February 2007 and November 2011.

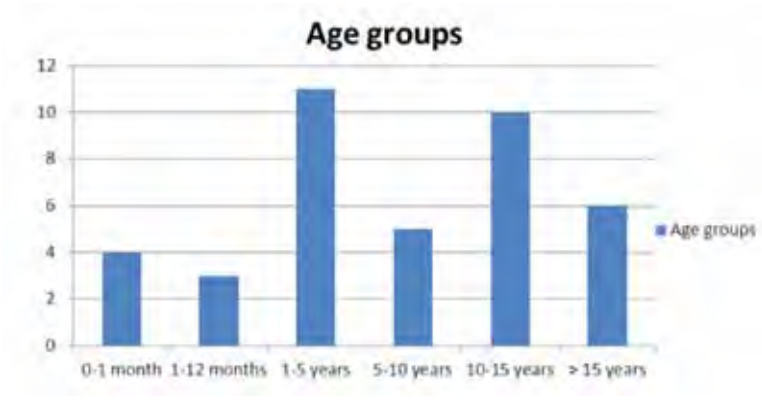


Figure 1: Age Distribution of operated patients

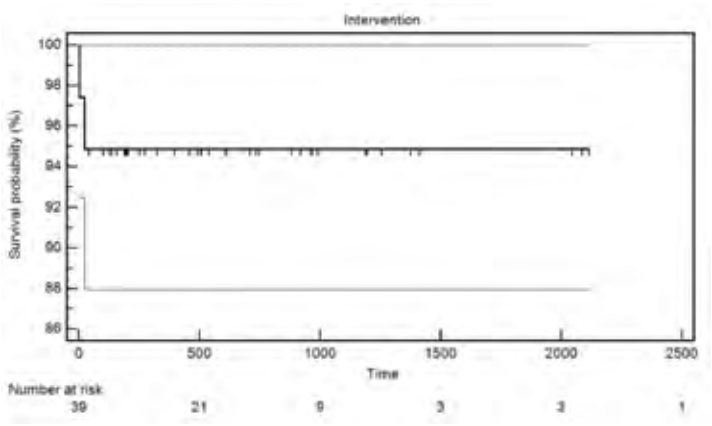


Figure 2: Freedom from re-intervention at three years

Twenty six patients (67%) were males and 13 (33%) were females. The median age at surgery was 5.5 years (3 days–18 years) Fig.1. Median weight was 16.7 kg (2.7-83.5 kg). Fourteen patients (36%) were diagnosed with aortic regurgitation, 13 (33%) had aortic stenosis and 12 (31%) had mixed disease. Fourteen patients (36%) had only leaflet augmentation with a combination of techniques and the remaining 25 patients(64%) had additional cardiac procedures.

Results

Early and late mortality, cardiac complications, Intensive Care Unit (ICU) and hospital stay, reintervention rates (catheter and surgery) and haemodynamic performance were reviewed.

Median bypass and cross-clamp times were 132 (34-444) min and 92 (25-236) min respectively. Median ICU and hospital stay were two (1-96) and five (3-96) days respectively. Postoperative cardiac complications occurred in two patients (5%). There were no early deaths and three (7.7%) late deaths, none directly related to the aortic valve.

At a maximum follow-up of 39 months and a cumulative follow up of 30.9 years, two patients (5%) have required surgical reintervention. At last follow-up, in 25 patients with aortic stenosis (pure/mixed), the median gradient had reduced from 3.8 m/sec (2.5-6) to 2 m/sec (1.25-3.6) (P value=0.02). In the 26 patients with aortic regurgitation (pure/mixed), only 3 patients 7.7% had mild to moderate regurgitation (P value=0.02). Kaplan-Meier freedom from reintervention was 95% at three years (Figure 2).

Early and late mortality, cardiac complications, Intensive Care Unit (ICU) and hospital stay, reintervention rates (catheter and surgery) and haemodynamic performance were reviewed.

Conclusion

A repair-oriented strategy for aortic valve disease has satisfactory early to mid-term results and is a promising management option in children with aortic valve disease.

Vascular: Abstracts 16:15–17:45 **Room 113**

Thirty years of elephant trunk: single center experience

Malakh Shrestha, Axel Haverich
Hannover Medical School, Germany.

Objective

Combined disease of the aortic arch and the descending aorta (aneurysms and Dissection) remains a surgical challenge. Various approaches have been used to treat this complex pathology. A single stage operation is performed either through a clam-shell incision or a combined median sternotomy and a lateral thoracotomy.

In the two-stage operation, at the first stage, the aortic arch is replaced through a median stenotomy. Later, at the second stage operation, the descending thoracic aorta is replaced through a lateral thoracotomy. So called 'Elephant trunk (ET) technique' was introduced by Professor Hans Borst and colleagues at our center in March 1982, greatly simplifying the second phase of the this two stage technique. We present our 30 years experience.

Methods

From 03/1982 to 03/2012, 179 patients (112 male, age 56,4±12,6 years) received an 'Elephant trunk' procedure for combined disease of the aortic arch and the descending aorta (91 aneurysms, 88 dissections (47 acute)). 55 of these patients had undergone previous cardiac operations. Concomitant procedures were performed if necessary. The cerebral protection was done either by deep (till 1999) or moderate hypothermic circulatory arrest & selective antegrade cerebral perfusion (SACP, after 1999).

Results

Cardio-pulmonary bypass (CPB) and X-clamp times were 208,5 ± 76,5 minutes and 123,7 ±54,8 minutes, respectively. The intra-operative mortality and 30 day-mortality during the Ist stage operation were 1.7% (3/179) and 17,3% (31/179, 15 with AADA), respectively. Peri-operative Stroke was 8,9% (n=16/176) Postoperative recurrent nerve palsy was present in 16,2% (29/176), Paraplegia 5,6% (10/176)

The second stage completion operation was performed as early as possible.

Fifty-one second stage completion procedures were performed, either surgically (n=46) or interventionally (n=5).

The intra-operative and 30-day-mortality after the second stage completion procedures were 5.8% (3/51) and 7.8% (4/51), respectively. The stroke, recurrent nerve palsy and paraplegia rates were 0%, 9.8% (5/51) and 7.8% (4/51), respectively.

Conclusion

'Elephant trunk' technique has greatly facilitated the two stage technique for surgical treatment of the combined diseases of the aortic arch & descending aorta. The initial learning curve, acute dissections, re-do & concomitant procedures partially explains the higher mortality rate. Despite the development of new hybrid techniques, there is still a role for the classical elephant trunk in selected patients, especially in context of proven long term results and cost effectiveness.

Professor Hans Borst

Cardiac: Focus Session 16:15–17:45 **Room 111**

Heart rejuvenation: Cardioplegia

David Chambers *St Thomas' Hospital, London, UK.*

The Oxford English Dictionary definition of 'rejuvenation' is – "make (someone or something) look or feel better, younger, or more vital". Cardioplegia does none of these things! An alternative definition is to 'restore to an original or new condition'. This is more in line with the potential of cardioplegia; thus, cardioplegia can prevent (or delay) the impact of ischemic injury to make the heart worse (ie. maintain the original condition).

However, current potassium-based cardioplegic solutions may not do even this very well, especially in the more elderly and sicker patients that are now seen by cardiac surgeons. It would appear to be time to think 'out of the box', and to introduce a new concept for myocardial protection that has the potential to provide optimal protection for all cardiac surgery patients. This concept involves arresting the heart in a 'polarized' manner, rather than by depolarization (as occurs with potassium as the arrest agent). Polarized arrest means that the heart is arrested at a membrane potential closer to the normal resting potential of the myocyte.

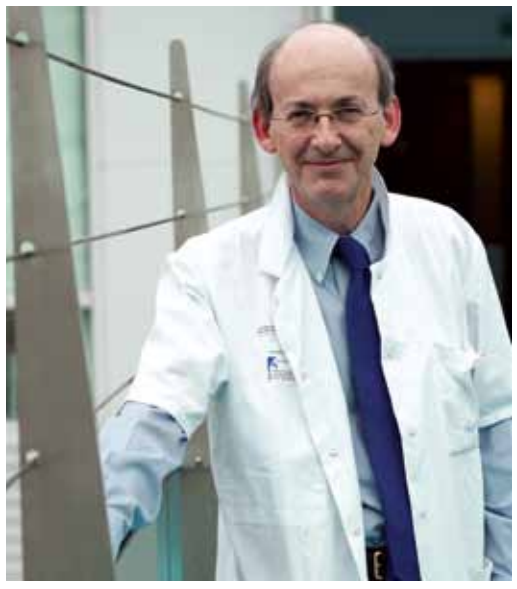
This will lead to more balanced ionic gradients, few channels or pumps being activated and reduced metabolic demand, thereby improving cellular protection. Polarized arrest involves using agents that interact with mechanisms involved in the action potential, such as the fast sodium channel, the potassium channel or the L-type calcium channel. Experimentally, cardioplegic solutions containing agents such as lidocaine (a sodium channel blocker) and adenosine (a potassium channel opener) have shown improved protection compared to hyperkalemic solutions. However, the high concentrations of lidocaine required to induce arrest, together with the prolonged efficacy of its action (with potential systemic toxicity), could be a clinical problem. Our recent studies have demonstrated the significant improvements that can be achieved using polarized arrest, and have lead to the development and characterization of a new cardioplegic solution using high concentrations of esmolol (an ultra-short-acting γ-blocker) and adenosine; this solution induces a polarized arrest since esmolol was shown to have both sodium channel and calcium channel blocking effects (independent of its γ-blocking properties), and provides significantly improved protection compared to hyperkalemic solutions in rat hearts (with these agents having the benefit of short half-lives independent of liver and kidney metabolism).

Current studies are examining the potential of this new solution (the St Thomas' Hospital polarizing solution) in pigs undergoing cardiopulmonary bypass, and preliminary results have shown this solution to be at least equivalent to the potassium-based St Thomas' Hospital cardioplegia. We hope that this new solution will soon be available for translation into the clinical arena.

The potential of these new ideas for improved myocardial protection is high, and may introduce a further advance in post-operative outcomes for the increasingly elderly population of patients currently undergoing cardiac surgery. Further research is essential, however, and we hope to widen the scope of the solution by examining its effects as a preservation solution, and for use in immature hearts for pediatric cardiac surgery.

Heart rejuvenation. Stem cells

Philippe Menasché *Hôpital Européen Georges Pompidou, Paris, France.*



Philippe Menasché

Along with whole organ replacement (heart transplantation) and cell therapy, heart rejuvenation is another strategy which aims at restoring a pool of contractile cells but in contrast to the two other approaches, it is based on harnessing the self-repair endogenous mechanisms of the heart. Theoretically, this could be accomplished by mobilizing three main cell types. The first comprises the putative cardiac stem cells which may be harboured in niches in the heart and could be either recruited pharmacologically (for example by drugs like neuregulin, which is the subject of an ongoing clinical trial) or harvested during a cardiac procedure, culture-expanded and then intracoronarily reinjected, like in the SCIPIO trial whose enthusiastic results need to be cautiously interpreted. The reason for this caution is that these cardiac stem cells raise several issues, primarily the identification of their phenotype and their persistence in the adult, diseased human heart. The second cell type of interest in the context of self-rejuvenation comprises the epicardial cells, known to play an important role in embryonic cardiopoiesis. These cells might undergo an epithelial-to-mesenchymal transition and generate a pool of cells with a cardiomyogenic and vascular differentiation potential under the influence of appropriate cues, among which thymosin γ-4 which is planned to be tested clinically in patients with an acute myocardial infarction. Of note, however, this approach is plagued with the possibility that epicardial cells in the adult ischemically-diseased heart may have lost this phenotypic plasticity. The third cell type to consider comprises the cardiac fibroblasts as it has been proposed to reprogram them to drive their phenotype directly towards a cardiomyogenic lineage, without going back to an embryonic-like state, but this conversion is currently achieved by using compounds which make realistically unlikely clinical applications, at least in a near future. In summary, the study of the endogenous self-repair mechanisms is certainly important to better understand signalling pathways involved in heart development and possibly use these data for developing effective therapies but it is still uncertain whether, in the future, self-supported rejuvenation can challenge transplantation of exogenous stem cells endowed, regardless of their tissue source, with an angiogenic and/or a cardiomyogenic differentiation potential.

Vascular: Abstracts 16:15–17:45 **Room 113**

Outcome of open surgery for chronic type B aortic dissection

Nozdrzykowski M, Garbade Jww, Lehmkuhl L, Misfeld M, Borger, and Mohr FW
Heart Center Leipzig, University of Leipzig, Germany

Abstract Background

Generally, patients with chronic uncomplicated Stanford type B aortic dissection (TBAD) are treated medically, but some of the affected aortas progress to aneurysmal dilatation and rupture during the chronic phase. The purpose of this study is to evaluate the survival and outcome of patients with TBAD with a focused on open surgery as first or second procedure after thoracic endovascular aortic repair (TEVAR).

Methods

Between 2000 and May 2010, we identified 80 consecutive patients (59 male, median age 63, interquartile range (IQR) 55-69) submitted with chronic TBAD who were treated at our institution. Of these patients, 41 were treated medically (group A, median age: 64, IQR: 57-70.5), 17 received TEVAR (group B, median age: 66, IQR: 56-71.5) and 22 patients underwent open surgery (group C, median age: 60, IQR: 53-64). Median follow-up was 1,235 days and for all of patients completely available.

Results

There were no significant difference in gender and co-morbidities. The patients in group A were significantly older (p=0.03). The indications for open surgery (group C) were progressive enlargement of the diameter of the dissected segment of the aorta (n=12, median: 59mm, range: 51-65mm), free rupture (n=2), impending rupture (n=1). In seven out of the primarily 24 patients treated with TEVAR by chronic TBAD endovascular therapy failed or resulted in a severe complication. The indications for secondary conventional surgical procedures after TEVAR were in detail: type I endolaek (n=2), covered rupture with prolonged neurological dysfunction (paraplegia) (n=1), infection of the endoprosthesis (n=1), migration of stent (n=1), aortobronchial fistula (n=1), and an enlargement of the aneurysma sac (n=1). Twenty five patients (31.2%) had a complicated TBAD and ten of them required open surgery. The overall mortality rate was 20% (n=16). In detail, the mortality for group A was 12.2%, for group B 29.4 and for group C 27.3%. The incidence of emergency procedures was significantly higher in groups B and C (p<0.05). The maximal aortic diameter was significantly higher in group C (median: 65mm, IQR: 56-70; p<0.05) as in another two groups. The re-intervention rate was required in 26.8% in group A (n= 11) and 11.7% in group B (n=2). No patients in group C required re-intervention. Stroke occurred postoperatively more often in group C (18.2%, p=0.01). The rate of another major complications (e.g. paraplegia, malperfusion) did not differ significantly between the treatments group. In Cox regression analysis, aortic diameter, emergency, Marfan's syndrome and coronary artery disease were identified as independent predictors of death.

Conclusions

Despite optimal medical therapy, 31.2% of patients with chronic TBAD developed during the natural course of dissection complications and 40% of them required open surgery, as first or secondary procedure after TEVAR. The efficacy of open repair for chronic TBAD is highlighted by normal survival after the first year, and a low reintervention rate.

Cardiac: Focus Session 16:15–17:45 **Room 114**

Aortic valve replacement in geriatric patients with small aortic roots: are suture-less valves the future?

Malakh Shrestha and Axel Haverich
Hannover Medical School, Germany

Objective

Aortic valve replacement (AVR) in geriatric patients (>75 years) with small aortic roots is a surgical challenge. To avoid 'Patient-prosthesis mismatch' long X-clamp times necessary for stentless valves or root enlargement are matters of concern. We compared results of AVR with suture-less (Sorin Perceval) against those with conventional biological valves performed at our center.

Methods

Between 4/2007 and 12/2012, 120 isolated AVR were performed in patients with small annulus (<22mm) at our center. In 70 patients (68females, age 77.4±5.5 years) conventional valves (C-Group) and in 50 patients (47females, age 79.8±4.5 years) sutureless valves (P-Group) were implanted. The Logistic EuroSCRORE of C group was 16.7±10.4 and that of P group 20.4±10.7 respectively. Minimally access surgery was performed in 4.3% (3/70) patients in C group & 72% (36/50) patients in P group, respectively.

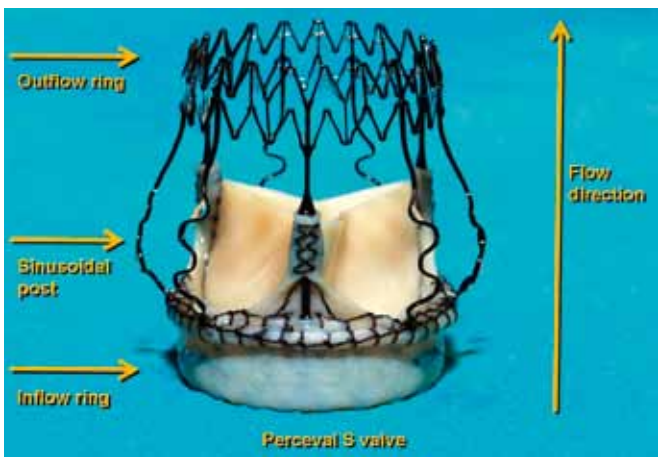
Results

The cardio-pulmonary bypass (CPB) and X-Clamp times of C group were 75.3±23 and 50.3±14.2 minutes and 58.7±20.9 and 30.1±9 minutes in P group, respectively. In C group, two annulus enlargements were performed.

Axel Haverich

Malakh Shrestha

Thirty-day mortality was 4.3% (n=3) in C group and 0 in P group respectively. In follow-up (up to five years), mortality was 17.4% (n=12) in C group & 14% (n=7) in P group, respectively.



Conclusions

This study highlights the advantages of the suture-less valves for geriatric patients with small aortic roots. This is reflected in shorter X-clamp and CPB times even though most of these patients were operated via a minimally invasive access. Moreover, due to the absence of sewing-ring, these valves are also almost 'stent-less' with greater valve effective orifice area (EOA) for any given size. This may potentially result in better hemodynamics even without the root enlargement. This is of advantage as several studies have shown that aortic root enlargement can significantly increase the risks of AVR.

Moreover, as seen in this series, these valves may also enable broader application of minimally invasive AVR.

Cardiac: Focus Session 16:15–17:45 **Room 115**

Aortic valve replacement with the Perceval S sutureless prosthesis: clinical outcomes

Konstantinos Zannis
Insititut Matualise Montsouris, Paris, France

Konstantinos Zannis

The experience with sutureless valves started at the IMM centre in 2007. Since then we have implanted the Perceval S valve on 143 patients, which we were able to follow up yearly with a maximum follow up of five years.

The Perceval S valve is a pericardial trileaflet valve mounted in a superelastic alloy stent which can be collapsed before implantation and then released in the aortic root. Its sinusoidal and flared-out design allows its anchoring in the Valsalva sinuses.

The valve proved to be easy to implant, showing a 99.3% of implant success, and looks stable in the first five years: during the entire follow up there was no valve migration or SVD. The Perceval S valve can be implanted through a MIS approach, and this advantage has allowed a more intensive shift towards minimally invasive approaches.

In terms of surgical technique sutureless valves reduce both cross clamp and bypass time when compared to traditionally implanted surgical valves since suture positioning and knotting are time consuming procedures. A comparison of our overall mean pump and cross clamp time with the STS database results demonstrated a reduction of surgical times of 50-60%. Myocardial tolerance to hypoxia and ischemia are reduced in older patients we could therefore suppose that older patients could benefit from these kind of device, advantage could even be greater for the subgroup of those necessitating associated by-pass surgery and therefore exposed at even longer myocardial ischemia.

The profile of patients selected for the implant was quite critical, as the mean age was 79.4±5.9 years and the Median preoperative logistic EuroSCORE was 12.04 ± 10.7, one third having concomitant procedures.

The valve hemodynamics was good in all sizes, showing single digit gradients after one year of follow up. The hemodynamic profile observed in this study is particularly interesting for size S, specifically designed for small aortic annulus. It is reaching a level close to the one observed with stentless valve rather than to the one commonly found in other stented valves. The interesting Perceval S hemodynamic performances translate in improvement of patients' clinical status assessed by NYHA class postoperatively. In fact, within the first year following the implantation, a clear improvement in NYHA class was observed. While half of the patients were classified as severely impaired at inclusion, 64.6% of the patients were in NYHA class III or IV preoperatively, while at one year, 94.4% of the patients were in NYHA class I and II.

In terms of clinical outcomes the mortality rate in the early period was 3.5%, while at five years the overall survival rated at 85.5%.

The results at five years represent, at the best of our knowledge, the longest experience ever reported with a sutureless device, and show that the Perceval S sutureless bioprosthesis offers an attractive alternative to AVR, especially in the older and frail patients.

Tricuspid regurgitation and mitral regurgitation

Jolanda Kluin *UMC, Utrecht, Netherlands*

Significant mitral valve regurgitation is prevalent in 2% of the adult population Several safe and effective surgical approaches to treat mitral valve regurgitation have been developed over the past decades. While outcomes of surgically corrected mitral valve disease are excellent, a significant amount of patients are hampered by late tricuspid regurgitation (TR).

TR is not a benign disease: five-years survival for moderate to severe TR is 74%. TR is present in up to 70% of patients with mitral valve disease and it progresses in 20-50% within five years after mitral valve surgery, even without left-sided dysfunction. Reoperation to correct TR in this setting carries a high operative mortality (up to 20-50% in-hospital mortality) and poor functional results. Because the persistence or progression of TR badly affects the long-term mortality and morbidity, it would seem logical that during mitral valve repair surgery, people may at the same time undergo tricuspid valve repair. However, tricuspid valve repair currently appears severely underutilized. The current surgical volume of tricuspid valve repair represents only one-tenth of the >40.000 mitral valve operations performed yearly in the US.

The occurrence of late TR seems unrelated to residual or recurrence of left sided valve disease and often also unrelated to the amount of pre-operative TR. Some studies have pointed out that not TR should be treated but tricuspid annular dilatation. If a tricuspid annulus of more than 40mm would be used as a cut-off value above which tricuspid annuloplasty would be performed, some have estimated that about 50% of mitral surgery patients should also undergo concomitant tricuspid annuloplasty

Due to the differences in indication (degree of TR versus annulus dilatation) and imaging modalities, the therapeutic procedure in patients with severe mitral regurgitation and less than severe TR varies widely: the percentage of patients undergoing concomitant tricuspid repair varies between <10% to >70% amongst institutions and countries. Systematic evidence regarding how the currently available imaging and technical procedures compare with one another is lacking. Given the growing health burden, optimal utilization of health resources to treat patients with mitral valve regurgitation is essential to both optimize patient outcome and minimize costs of treatment.

In the guidelines, none of the recommendations derive evidence from randomized studies. Unless large-scale randomized trials are undertaken, it is likely that expert opinion, extrapolation, and indirect correlates, rather than direct evidence, will continue to form the basis of most practice recommendations for management of functional TR.

We therefore designed a prospective randomized controlled multicentre trial (CONSUMER trial) that aims to quantify the effectiveness and cost effectiveness of concomitant tricuspid valve repair compared to mitral valve repair alone in the treatment of patients with severe mitral regurgitation and less than severe TR.

Cardiac: Abstracts 16:15–17:45 **Room 118/119**

Is anti-platelet therapy needed in continuous flow LVAD Patients? A single center experience

Pierre-Yves Litzler and Hassiba Smail *Rouen University Hospital Charles Nicolle, Rouen, France*

Pierre-Yves Litzler

Hassiba Smail

The treatment of refractory heart failure with a left ventricular assist device (LVAD) is now a widespread method for bridge to transplant (BTT) or destination therapy (DT). Early after the European experience in the Heart Mate II device (HMII) (Thoratec, Pleasanton, CA) implantation, the first results revealed a higher incidence of bleeding events than the thrombotic complications.

There is no consensus of antithrombotic procedure and different protocols are used, including Vitamin K antagonist with or without aspirin and clopidogrel.

In order to minimize hemorrhagic complications, most of experienced centres intend to reduce the anticoagulation therapy. At the beginning of our experience, aspirin was administered, but due to severe bleeding we discontinued it. We aim to report the safety and effectiveness of our anticoagulation protocol using vitamin K antagonist without Aspirin in patients supported with HMII device.

We retrospectively reviewed the clinical and biological data of 27 patients with the HMII between February 2006 and September 2011, (26 men), mean age was 55,7±9.9 years. Most patients 16 (59,3%) had ischemic cardiomyopathy and mean duration of support was 479±436 (1-1555) days with 35.4 patient years on support. Six patients were implanted for destination therapy.

The anticoagulation therapy was fluindione for all patients, and Aspirin was administered only to 4 patients for 6, 15, 60, 460 days. Due to gastro-intestinal bleeding and epistaxis, Aspirin was discontinued, and since August 2006, no patients have received antiplatelet therapy.

At three years the survival rate during support was 75%. The most common postoperative adverse event was gastrointestinal bleeding (19%) and epistaxis (30%) (Median time: 26 days) for patients receiving fluindione and aspirin. Mean INR was 2.59 ± 0.73 during support. Fifteen patients have been tested for acquired Von Willebrand disease. We observed a reduced ratio of collagen binding capacity and ristocetin cofactor activity to VWF antigen in six patients. In the postoperative period, two patients had an ischemic stroke at one and eight months. One of them had a history of carotid stenosis with ischemic stroke. There were no patients with hemorrhagic stroke or transient ischemic attack. Among the patients treated only with fluindione, the event rate of stroke per patient-year was 0,059. The mean incidence of any type of stroke in literature is 0,17 (mean; range 0,06-0,29) strokes per patient-year in patients with HMII and a regimen of postoperative heparin converted to warfarin and aspirin.

The low risk of thromboembolic event without the use of antiplatelet therapy in our experience may be explained by the substantial alteration of the platelet function in patients with axial flow LVAD.

Antiplatelet therapy with aspirin is given to patients with HMII LVAD, but the efficacy of this practice has not been determined; platelet function studies and thromboelastogram may help in assessing the need of antiplatelet therapy.

In conclusion, Fluindione regimen without Aspirin in HMII support seems do not increase thromboembolic events and could reduce the risk of hemorrhagic events. Further controlled studies are needed to confirm these findings.

Cardiac: Focus Session
16:15–17:45 **Room 115**

Double valve replacement: Biological versus mechanical prostheses

Elsayed Elmistekawy, Vincent Chan, Buu Khanh Lam, Thierry G. Mesana, and Marc Ruel* *Division of Cardiac Surgery, University of Ottawa Heart Institute, Ottawa, Canada*

Concomitant aortic and mitral valve disease may occur secondary to rheumatic disease, bacterial endocarditis, or degenerative changes.While Current guidelines serve as a guide to aid patients and their surgeons select the optimal prosthesis in single position either the aorta or mitral; however To date, there are no guidelines or large published data to help with prostheses selection in double valve replacement (DVR) procedures. We studied the long term outcomes of patients who underwent double valve procedures (Aortic and Mitral valve replacement)

This study included 319 patients who had first time DVR after 1980. Patients were followed in a dedicated valve clinic at Ottawa Heart Institute.

We found that patients who underwent double biological valve replacement had worse long-term survival compared to patients who underwent double mechanical valve replacement, after correcting for age and gender. Most notably, we found that the difference in long-term survival was apparent in patients 71 years of age or less.

We also found that the hazard ratio for reoperation is statistically more in biological double valve compared with mechanical double valve and at 10 years after surgery 97% of patients who had two mechanical prostheses were free from reoperation compared with 66% of patients who had two biological prostheses.

In the current study, the perioperative mortality following double valve surgery was in general lower than reported in other studies and there was a significant difference for those who received two biological valves (21 patients (14%) versus 13 patients (7.7%); P=0.04).

The use of two mechanical valves is associated with a lower rate of reoperation. Notably, DVR reoperations are not low risk. It was estimated that mortality rate of redo surgery ranges from 11%-25%.

At present, some biological valves may be replaced with percutaneous valve-in-valve technology; however, the feasibility and durability of this technique is not yet established and it is not without a risk, especially in DVR scenarios

These results constitute a single center experience and the results may be not generalizable; furthermore, the cut off age at which mechanical versus biological valve selection prevails may need to be readdressed due to the increasing longevity of populations.

Cardiac: Focus Session 14:15–15:45 **Rooms 115/117**

Alternative Surgical Access for TAVI – Transaortic and Subcalvian

Vinod Bapat *Department of Cardiothroacic Surgery & Cardiology, Guy's and St. Thomas' Hospital, London, UK.*

Aortic Stenosis (AS) is a major cause of cardiovascular morbidity and mortality in the elderly. There has been a marked growth in TAVI especially over the last two years, 2011-2012 with it now being approved in around 50 countries including the United States of America.

TAVI is performed via two approaches, Transapaical (TA) and Transfemoral (TF) route. Medtronic CoreValve can only be implanted through the TF approach whilst Edwards Spaien valve can be implanted through either the TA or the TF route. As the latter is less invasive it is preferred over the TA approach.

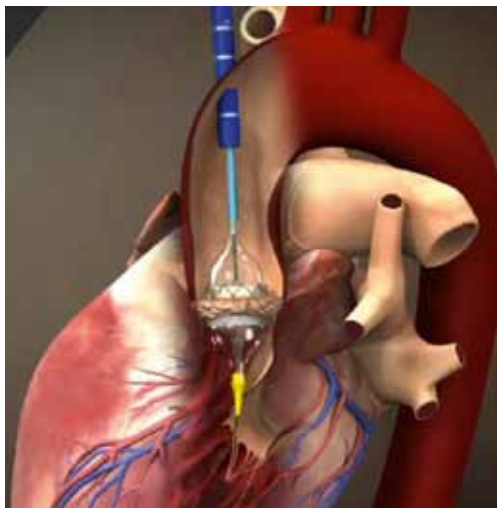
Despite the short-term results of both TA and TF approaches being comparable in centres performing a large number of such cases, the TA approach has been found to be more invasive in nature. In comparison to the TF approach, the TA approach has 3 main drawbacks, which may contribute to the increased morbidity and mortality in these patients

1. Complication of the access site: Apical rupture and Delayed pseudoaneurysm formation
2. Complication of thoracotomy: Interference with postoperative respiratory dynamics
3. Complication of purse string suture: Effects on left ventricular function

Apical rupture remains a dreaded complication being associated with a higher mortality and a lower one-year survival rate. Despite increasing experience and availability of smaller delivery systems (22-26 French), apical tear and rupture still occur and are mainly due to the poor quality of the cardiac tissue where the purse string is placed. Intra-operative and or immediate postoperative left ventricular apical rupture/bleeding are not uncommon being associated with poorer outcome. TA approach and apical venting can also lead to late pseudoaneurysm formation. Furthermore TA approach cannot be used for implanting CoreValve.

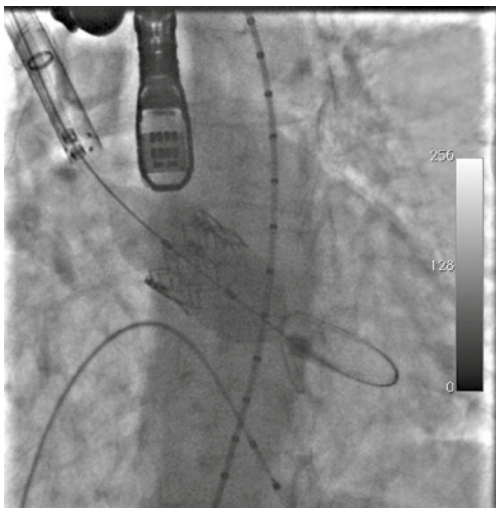
This led to development of two alternative access routes with the aim of reducing morbidity and mortality; Transaortic (TAo) approach and Subclavian approach.

TAo approach can potentially overcome issues associated with TA approach as it entails purse-strings on the aorta as opposed to the left ventricle. Aortic cannulation is performed on nearly every open heart surgery and has proven to be safe. The Aorta is an elastic structure and hence the chances of immediate or delayed complications are less. In addition it is a technique with which surgeons are familiar and hence will



have a shorter learning curve. Furthermore, TAo route can also be used for implanting CoreValve. Although the TAo approach was initially used to treat patients not suitable for TA approach it has slowly grown in popularity and is now preferred over TA in many centres. This is reflected in the development of a dedicated delivery system for TAo, Ascendra plus for Edwards Sapien XT valve and a dedicated delivery system for Medtronic Corevalve to be released soon. It is now conceivable that TAo may become the preferred approach over TA, especially if there is a shift in using this technology in lower risk patients thus enabling them to live longer following the procedure.

Although the Subclavian route was explored for



CoreValve implantation as early as 2007 it was only used when the TF approach was not possible. Increasing experience in this approach has seen its popularity grow comparable with that of the TF approach in some centres such as Italy. Improvements in delivery systems such as smaller calibre and improved manoeuvrability will indeed increase its application in future.

Since performing the first successful case with Sapien valve through TAo approach our effort has been to standardise the procedural steps in order to make the procedure easily reproducible.

I will be demonstrating a case at techno-college using the new Ascendra plus system and will also discuss the operative steps in detail.

Thoracic: Abstracts 16:15–17:45 **Room 133/134**

Two-stage unilateral versus one-stage bilateral single-port sympathectomy for palmar and axillary hyperhidrosis

Cecilia Menna
University of L'Aquila, Teramo, Italy;

Several efforts have been made to recognized surgical therapy as the treatment of choice for patients with primary palmar and axillary hyperhidrosis, a disorder characterized by excessive perspiration beyond thermoregulatory needs, particularly in response to temperature or emotional stimuli. To date among all the different surgical approaches, video-assisted thoracoscopic sympathectomy has been shown as safe and minimally invasive procedure. Numerous critical issues have still to be overcome to obtain more detailed reports on long-term results after video-assisted thoracoscopic sympathectomy. Although video-assisted thoracoscopic sympathectomy is a standard technique, however to our best knowledge a proper investigation on new critical aspects underlying the main side effects, as compensatory sweating, after surgical procedure has never been shown.

Compensatory hyperhidrosis (postoperative increase of sweating in regions of the body where it had not been previously observed) is the most common late complication, with different incidence reported in previous studies, ranging from 33% to 85%. However the mechanism of compensatory hyperhidrosis is still unclear. An alternative to reduce compensatory sweating consists in applying metal clips to interrupt the sympathetic chain by compression.

In our study one-hundred and thirty patients received one-stage bilateral, single port video-assisted thoracoscopic sympathectomy (one-stage group) and one-hundred and forty patients two-stage unilateral, single-port video-assisted thoracoscopic sympathectomy (two-stage group). Single-port thoracoscopic sympathectomy was associated with a low rate of compensatory hyperhidrosis. However, compensatory sweating occurred more frequently in one-stage group patients.

Our final and novel aim was to identify variables related to the occurrence of compensatory sweating and pneumothorax after surgical procedure. Specifically, in our study in line with other reports, we confirmed that bilateral and unilateral single-port sympathectomy for primary hyperhidrosis are effective, safe and feasible surgical techniques. More interestingly, we demonstrate for the first time that two-stage surgical approach could be a possible strategy to avoid compensatory sweating occurrence.

Cardiac: Abstracts 14:15–15:45 **Room 116/117**

Comparison of original euroscore, EUROScore II and STS risk models in an elderly cardiac surgical cohort

Ayse Gul Kunt *Ankara Ataturk Education and Research Hospital, Bilkent, Ankara, Turkey*

Scoring systems are essential part of current cardiac surgical practice in assessing operative mortality and morbidity. European System for Cardiac Operative Risk Evaluation (EuroSCORE) and The Society of Thoracic Surgeons (STS) database are popular cardiac risk models in the world. Moreover, the use of EuroSCORE model in adult Turkish cardiac surgical population is obligatory practiced by the national health authority and Turkish Social Security Agency.

We, therefore, aimed to compare these three risk models on a prospectively collected data from Turkish elderly cardiac surgical population stored in the TurkoSCORE database. The mean patient age was 74.5±3.9 years at the time of surgery, and 35% were female. For the entire cohort, actual hospital mortality was 7.9% (n=34; 95% confidence interval [CI] 5.4-10.5).

Ayse Gul Kunt

However, additive EuroSCORE predicted mortality was 6.4% (P>0.05 vs observed; 95% CI, 6.2-6.6), logistic EuroSCORE predicted mortality was 7.9% (P>0.05 vs observed; 95% CI, 7.3-8.6), EuroSCORE II predicted mortality was 1.7% (P<0.001 vs observed; 95% CI, 1.6-1.8), and STS predicted mortality was 5.8% (P>0.05 vs observed; 95% CI, 5.4-6.2). The mean predictive performance of the analyzed models for the entire cohort was fair with 0.7 (95% CI, 0.60-0.79). AUC values for additive EuroSCORE, logistic EuroSCORE, EuroSCORE II, and STS risk calculator were 0.70 (95% CI, 0.60-0.79), 0.70 (95% CI, 0.59-0.80), 0.72 (95%CI, 0.62-0.81), 0.62 (95%CI, 0.51-0.73), respectively.

The results of our study suggest that EuroSCORE II significantly underestimated mortality risk for Turkish elderly cardiac patients whereas additive and logistic EuroSCORE and STS risk calculators were well calibrated in this cohort. Ethnicity, seasonal variations and single center study should be kept in mind. Subsequently, the second part of the study is being considered for the postoperative complications in the same population.

Now, we will complete and check the database of the current population and then we will share with you.

Thoracic: Abstracts 16:15–17:45 **Room 133/134**

Omitting chest tube drainage after thoracoscopic major lung resection

Kazuhiro Ueda *Yamaguchi University Graduate School of Medicine, Yamaguchi, Japan*

Background

We previously reported the excellent effect of fibrin glue when it was used in combination with a bioabsorbable mesh: the chest tube could be removed the day after the operation in 90% of patients undergoing lung lobectomy for cancer [1,2]. In addition, compared with the conventional procedure using fibrin glue alone, our technique led to a reduction in the rate of postoperative pulmonary complications and the length of the postoperative hospital stay [2], which in turn accelerated the postoperative physiological rehabilitation [3]. Considering these favorable results, our next goal was to omit postoperative chest tube placement in selected patients undergoing thoracoscopic major lung resection. To identify the patients who did not need postoperative chest tube drainage, we defined original criteria to confirm pneumostasis during the intraoperative air leak test based on our previous observational study. By referring to the intraoperative air leak test results, we were able to remove the chest tube in the operating room in eligible patients. This study was conducted to clarify the feasibility of omitting chest tube placement after thoracoscopic major lung resection.

Methods

Intraoperative air leaks were sealed with fibrin glue and absorbable mesh in patients undergoing thoracoscopic major lung resection. The chest tube was removed just after tracheal extubation if no air leaks were detected in a suction-induced air leak test, which is an original technique to confirm pneumostasis. Patients with bleeding tendency or extensive thoracic adhesions were excluded.

Results

Chest tube drainage was omitted in 29 (58%) of 50 eligible patients, and was used in 21 (42%) patients, based on the suction-induced air leak test results. Male gender and compromised pulmonary function were significantly associated with the failure to omit chest tube drainage (both, $P<0.05$). Regardless of omitting the chest tube drainage, there were no adverse events during hospitalization, such as subcutaneous emphysema, pneumothorax, pleural effusion, or hemothorax, requiring subsequent drainage. Furthermore, there was no prolonged air leakage in any patients: The mean length of chest tube drainage was only 0.9 days. Omitting the chest tube drainage was associated with reduced pain on the day of the operation ($P<0.05$).

Conclusion

The refined strategy for pneumostasis allowed the omission of chest tube drainage in the majority of patients undergoing thoracoscopic major lung resection without increasing the risk of adverse events, which may contribute to a fast-track surgery.

Bioabsorbable mesh, used in the study, is exhibited at booth No: 23 (GUNZE LIMITED).

References:

1. Ueda K, et al. Sutureless pneumostasis using polyglycolic acid mesh as artificial pleura during video-assisted major pulmonary resection. Ann Thorac Surg 2007; 84: 1858-61.
2. Ueda K, et al. Sutureless pneumostasis using bioabsorbable mesh and glue during major lung resection for cancer: Who are the best candidate? J Thorac Cardiovasc Surg 2010; 139: 600-5.
3. Ueda K, et al. Mesh-based pneumostasis contributes to preserving gas exchange capacity and promoting rehabilitation after lung resection. J Surg Res 2011; 167: e71-e75.

Residents' Session 14:15–15:45 **Room 118/119**

P-MEC – a novel closed-circuit minimally invasive pediatric extracorporeal circulation: from conception to clinical conduction

Pero Curcic, I Knez, I Ovcina, J Krumnikl, T Marko, H Suppan, H Mächler, D Dacar *Medical University of Graz, Austria*

Closed perfusion systems, when compared with conventional open cardiopulmonary bypass (CPB) systems, have shown superior performance in the adult population resulting in reduced priming volumes, transfusion requirements and inflammatory response activation. We have established a stepwise, closed-circuit animal model which enabled simultaneous measurements of organ specific continuous, parenchymal pO2/pCO2 changes and metabolic variables detected from the parieto-temporal lobe of cerebrum, the LV myocardium and the right hepatic lobe using opto-chemical probes.

Our project commenced in 2009 at the Medical University of Graz, Austria. During the first phase,we tested 14 testing animals (pigs, 30.7±2.5kg) in a randomised study comparing CPB with P-MEC. We found significantly higher need for priming blood transfusion(1000±823 mls vs. 50±36mls) and higher perioperative lactate levels in group CPB ($p<0.000001$). ANOVA at different timepoints of surgery emphasized significantly higher positive cerebral pO2 levels ($p=0.007$) in group P-MEC. In contrast, both hepatic and myocardial negative pCO2 levels were significantly higher in group CPB ($p=0.004$).

In the second phase, we repeated the experiment with minimized closed circuit and lighter animals (10.7±2.8kg). Experimental results showed consistently the same significant differences.

In the clinical phase, between August 2011 and June 2012, we operated on 11 patients with congenital heart defects (extracardiac TCPC 4 pts, ASD patch closures 5pts, ASD primum closure+RVOT procedure 1pt, atrioseptectomy+ap-shunt 1pt) with mean weight 8.3-18.7kg, mean age 4±1.7yrs; using the in-house developed and newly named Medtronic P-MEC. The system is characterized by a reduction of priming volume of up to 50%, a novel miniaturized oxygenator and the possibility of immediate safety-conversion to open extracorporeal circulation. Mean CPB duration time was 57±30min. The mean preoperative haematocrit was 39±9%, on-pump 30±6% and postoperatively 33±7%. No blood transfusions were required during the procedures. In 8 out of total 11 patients, packed red-blood cell units would have been primed using any conventional CPB. Postoperative lactate levels were below 1.2mmol/l. None of the patients had an embolic event.

We conclude that the P-MEC® may provide an alternative to routinely used CPB in paediatric population. Prospective multicentre studies are needed to confirm our findings in different settings and to provide further evidence of safety and efficacy. We would welcome an opportunity to collaborate on such projects with interest colleagues world-wide.

Pero Curcic

An update from the EPR

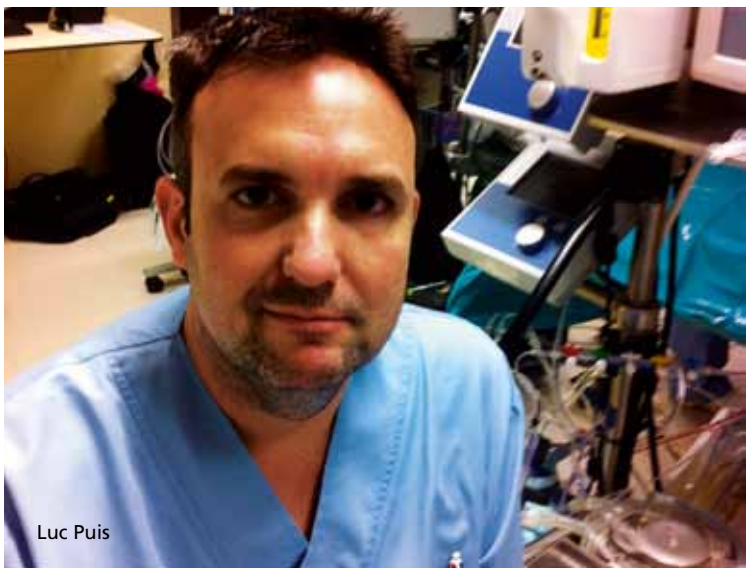
The European Perfusion Registry (EPR) has been formally established since October 2011 by a group of perfusionists based across Europe. The aim of the EPR is to provide a platform for measuring and improving the quality of practice in perfusion. A registry will serve to collect data from extracorporeal procedures during cardiac surgery. We have been presenting our ideas at a number of international perfusion conferences and received favourable feedback validating our aims.

There are many methods, models and principles to choose from to do improvement research and to improve practice performance, but no matter which method(s) you use, all methods require measurement of practice. Cardiac surgery being a team effort, we sought cooperation with other members of the cardiac surgery team. Since a high quality database of cardiac surgery already exists in Europe, The EACTS Adult Cardiac Surgery database, it was considered sensible to adhere to this extensive registry to be able to match surgical and perfusion data from the same patients. This fits in neatly with previously published aims, "The EACTS is thus to establish a Quality Improvement Program Taskforce and has chosen quality improvement as the main theme of the 26th annual EACTS meeting in Barcelona".

Not interested in being another exercise in merely number crunching, we rather strive to form the basis of a program that will enable participants to measure quality of practice and improve on this, in a never-ending cycle of evaluation and amelioration. It is therefore with great enthusiasm that we can announce our participation in the EACTS Quality Improvement Programme (QUIP). The QUIP, which is in its initial phase of gathering specialists and programmes experienced in quality improvement, has the same mission and vision on quality assessment and improvement and is thus ideal for cooperation between surgeons and perfusionists.

In order to establish a dataset, which is deemed suitable by and for most perfusion programmes, the EPR will undertake an international survey on perfusion practice. The survey is aimed to detect variability in practice, and to determine which questions must likely be answered to target data collection to find the answers to those questions.

The results achieved from the collection and processing of extracorporeal procedures data, combined with the surgical data will be used to identify risk factors for outcome assessment such as blood transfusion, length of stay, morbidity and mortality and complications. Furthermore pre, per- and post-operative quality indicators will provide us tools to measure the quality of care and help us in improving it. This information can be integrated into clinical pathways to provide the best perfusion care for general and specific patients undergoing extracorporeal procedures.



Luc Puis

Specialists in clinical database software for hospitals and national/international registries

- Installations in 250+ hospitals worldwide
- 90+ national and international databases
- Systems in 40+ countries

EACTS 2012
To learn more about our products and services, and to be given a demonstration of our software please visit
Stands 98–99

reveal interpret improve

DENDRITE
CLINICAL SYSTEMS

Station Road - Henley-on-Thames - RG9 1AY - United Kingdom
Phone: **+44 1491 411 288** - e-mail: **info@e-dendrite.com** - **www.e-dendrite.com**